City of Port Phillip:
Staff engagement with
on-site office composting

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Executive summary

This report presents findings from research undertaken by Swinburne University exploring staff engagement with using worm farms for food scrap compost in the Town Hall building of the City of Port Phillip offices. The research was conducted between March and April of 2017 via an online questionnaire distributed to all Town Hall staff via email. Questions asked staff about their experiences of food separation and composting in the office.

Findings

- Respondents were pleased with, and supportive of, the worm farm initiative in the Town Hall building, and understood many of the benefits of having such a system in place.
- Challenges reported by respondents related to understanding what foods could or could not be included, and the frequency and consistency of the worm food bins being emptied.

Recommendations

- It is important that worm food bins are available in every kitchen, kitchenette, and anywhere else food waste may be disposed of (such as next to general waste bins).
- Worm food bins should be emptied more consistently and frequently.
- It may be beneficial to alter the type of lids that are on the worm food bins in the kitchens to ensure they are easy to open and operate.
- Further education is required so that all staff understand the kinds of foods that can and cannot be included in worm food bins.
- These messages can be expanded to include some of the nuances around the types of foods that worm farms can process in small quantities (such as milk residue from tea bags and small items of dairy or meat in lunch leftovers).
- Signage and education about food separation and the worm farms need to be consistent and available across all floors of the Town Hall.
- Large, colour posters, displaying pictures of foods acceptable to be composted, should be displayed directly adjacent to, or on, the food waste collection points on each level of the building.
- Further messaging should be provided to staff regarding the environmental benefits of composting, as this is a primary driver for participating.
• It may help address some of the concerns some staff had around smell and insects (particularly in some worm food bin locations) if the cleaners were contracted to empty the worm food bins in the kitchens more frequently, and if all these bins have secure lids which are easy to open, close and operate.

• It is important to continue to communicate to new staff, and current (including casual) staff that waste diversion is part of their role as a member of the City of Port Phillip.

• All new and current staff (including casual staff) should be inducted into the use of the worm farms. The induction should include a tour of the location of the worm food bins and worm farms, an explanation of why and how to separate the food waste, an explanation of the whole building process of food waste management, and a demonstration of how they can access the ‘fruits’ of their labour (i.e. worm juice and castings).

• As participation and correct food diversion increases, it may be necessary to increase the number of worm farms in the Town Hall building to meet demand. This could also help to further reduce the number, size and associated cost of general waste bins required for the building.
**Introduction and background**

Of all the waste that goes to landfill, approximately half is food waste. This costs around $50 million in landfill levies per annum, and produces methane, a greenhouse gas that is 72 times more powerful at trapping heat in the atmosphere than carbon dioxide (Sustainability Victoria 2013a). From 2010-2011, the state of Victoria disposed of 832,000 tonnes of food waste (Sustainability Victoria 2013a).

The City of Port Phillip has been considering practical ways to divert food organics from landfill across the city itself, by helping its residents to address their food waste through initiatives such as subsidies for home worm farms and compost bins (City of Port Phillip, 2017), and since October 2014, through successfully diverting the food waste generated in the Town Hall office building. Staff use and engagement with food separation and composting in the Town Hall building was explored by the present research, and is summarised in this report.

**Composting in City of Port Phillip offices**

The Town Hall building of the City of Port Phillip houses over 500 office staff (Figure 1), 15 Hungry Bin worm farms and one large custom worm farm in a specially reserved worm farm ‘workshop’ within the car park (Figure 2). Staff are encouraged to contribute to the worm farms by placing their food scraps in ‘worm food bins’ located in the kitchens throughout the building (Figure 3). Signage describing food appropriate for the worm food bins hangs nearby, and on the lid of, each worm food bin (Figure 4). As part of their regular cleaning duties (and included in their contract), the building cleaners then empty the worm food bins into large worm food wheelie bins in the car park (Figure 5). A member of the ‘Sustainability & Transport’ team then regularly processes these food scraps (checking for contaminants, chopping up pieces of food that are too large), and distributes the food scraps across the 15 worm farms (Figure 6). Worm farm castings and juice are made freely available to staff to take home, or are used by staff within the on-site vegetable garden (Figure 7).

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1 The research presented in this report was undertaken as part of a multi-disciplinary research project being conducted by Swinburne University, Melbourne, and the University of South Australia, Adelaide. Funded by the Cooperative Research Centre (CRC) for Low Carbon Living, the project is titled “Carbon reductions from composting food waste for food production – fitting recycling models to urban forms”.

2 There are also bins available in the worm farm workshop area for shredded newspaper, coffee grounds and other materials useful within with the worm farms. Additionally, there are separate wheelie bins for staff to recycle other items not suitable for kerbside collection, such as scrap metal, polystyrene, light globes, and clothing and other items for Op Shops.
Figure 1. The City of Port Phillip council offices located in the Town Hall building.  
Photo credit: Google earth

Figure 2. The worm farm and recycling ‘workshop’ in the car park of the Town Hall building.  
Photo credit: Brett Hedger
WORM FOOD ONLY

Most Fruit & Veg (cut small)
Tea Bags & Coffee Grounds
Paper Towel & Newspaper (moist)

Please don’t over feed us!

NO CITRUS / Pineapple
NO MEAT / Dairy
NO Sticks, Leaves or Wood
NO ONION / Capsicum / Garlic
NO RICE, PASTA or Bread
NO FAT or Oils

Figure 3. Worm food bin (right) located in one of the staff kitchens in the Town Hall building

Figure 4. Worm food signage displayed near the worm food bins
Figure 5. Worm food wheelie bins the cleaners dispose of the food waste into for sorting.

Figure 6. Hungry Bin worm farms located in the worm farm workshop in the carpark of the Town Hall building.
Composting technology

The Hungry Bin worm farm is a modular unit that can be installed in racks (Figure 8). It uses a vertical continuous flow system which makes it easier to use than other styles of worm farm. Rich in microbes, vermicompost has the following benefits when added to soil: it improves the soil structure, increases water retention, increases nutrients available to plants, helps store carbon and improves the resistance of plants to diseases and pests (Table 1). The Town Hall building houses 15 of these standard Hungry Bins, as well as a custom larger bin housing an estimated 150,000 to 200,00 worms, designed to process an estimated 10-20kg of food waste per day (Figure 9).

Table 1. Summary of Hungry Bin Worm Farm technology

<table>
<thead>
<tr>
<th>Type of food scraps processed</th>
<th>Infrastructure requirements</th>
<th>Processing capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fruit and vegetables (except onions, citrus, capsicum), plate scrapings, PLUS cardboard, paper, paper towels</td>
<td>Temperature not exceeding 32°C Indoors or outdoors</td>
<td>2kg/day/bin Multi-bin systems available as well as custom-built mega-bins</td>
</tr>
<tr>
<td>Ease of use</td>
<td>Processing time</td>
<td>Compost output</td>
</tr>
<tr>
<td>Fruit and vegetables need to be chopped. Carbon/nitrogen balance needs to be maintained.</td>
<td>Takes a few months for worms to be processing at maximum capacity.</td>
<td>Worm castings and juice – immediately usable (dilute worm juice 1:10).</td>
</tr>
</tbody>
</table>
Figure 8. Hungry Bin worm farm
(pinimg.com 2016)

Figure 9. Custom worm farm designed in consultation with Richard Thomas from Worm Lovers (Australian distributors of the Hungry Bins).
Research methods

In order to provide a snapshot of current food separation and worm farming practices and experiences across the Town Hall building, staff housed within the building were surveyed in March and April of 2017. An online questionnaire was distributed via a URL contained in an email that a City of Port Phillip staff member sent to 950 staff, on behalf of the research team. A follow-up reminder email was sent three weeks later.

The questionnaire was designed in consultation with the City of Port Phillip and asked staff about their use of the worm food bin, reasons for use or non-use and their experience of, and feelings about, being involved in the composting of food scraps at their workplace. The questionnaire and email invitation have been included as an appendix to this report (Appendix).

In this report, all those who participated in the research are referred to as respondents to distinguish them from those who participated in composting and food separation, who are referred to as composting participants. Some of the responses to open-ended questions, and comments throughout the questionnaire, have been included to demonstrate the depth and breadth of respondent opinions and experiences.

Results and Discussion

In total, 156 staff responded to the online questionnaire, equating to a response rate of 16%. The characteristics of the respondents are summarised in Table 2. Respondents represent a range of ages, genders, employment fractions and length of time working in the Town Hall building. The vast majority of respondents were not involved in the management of the worm farm (such as emptying the worm food bins into the worm farms) (99%). The extent of, and direction of, any non-response bias cannot be determined as there is no data available on the characteristics of staff in the Town Hall building.
Table 2. Characteristics of the respondents

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Response</th>
<th>%</th>
<th>n=</th>
</tr>
</thead>
<tbody>
<tr>
<td>Involved in managing the worm farm</td>
<td>Yes</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>99</td>
<td>154</td>
</tr>
<tr>
<td>Length of time working in the Town Hall building</td>
<td>0-6 months</td>
<td>19</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>7-11 months</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>1-5 years</td>
<td>34</td>
<td>53</td>
</tr>
<tr>
<td></td>
<td><strong>6 years or more</strong></td>
<td><strong>39</strong></td>
<td><strong>60</strong></td>
</tr>
<tr>
<td>Age group</td>
<td>Under 25 years</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td><strong>26-44 years</strong></td>
<td><strong>54</strong></td>
<td><strong>84</strong></td>
</tr>
<tr>
<td></td>
<td>45-64 years</td>
<td>40</td>
<td>61</td>
</tr>
<tr>
<td></td>
<td>65-74 years</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Gender</td>
<td>Female</td>
<td><strong>72</strong></td>
<td><strong>108</strong></td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>28</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td>Indeterminate, intersex, unspecified</td>
<td>0.7</td>
<td>1</td>
</tr>
<tr>
<td>Employment fraction</td>
<td>Full time</td>
<td><strong>71</strong></td>
<td><strong>109</strong></td>
</tr>
<tr>
<td></td>
<td>Part time</td>
<td>24</td>
<td>37</td>
</tr>
<tr>
<td></td>
<td>Casual</td>
<td>5</td>
<td>8</td>
</tr>
</tbody>
</table>

Note: The most prevalent characteristics are in bold font.

**Participation in food separation and composting**

Of the staff who responded to the questionnaire, the vast majority have placed food scraps in the foods scraps bin at some point (82%). Almost all of those who have contributed to the foods scraps bin previously continue to do so; over half indicated that they continued to place food scraps in the worm food bins every day (58%), while a quarter (25%) recalled they did so 2-3 times per week (Figure 10). Very few (3%) noted that they no longer contributed to the worm food bin.

![Figure 10. Responses to the question ‘Are you continuing to put food scraps in the worm food bin’](image-url)
The majority of staff regularly use the worm food bins. Three quarters of respondents usually place their food scraps in the worm food bins (77%), with less than a fifth usually using the rubbish bins in the kitchens instead (13%) (Figure 11).

![Figure 11. Responses to the question 'What do you usually do with your food scraps in the office'?](image)

It is useful to consider which staff are more likely to separate their food scraps for composting. Characteristics of the participating and non-participating respondents are compared in Table 3. Age or gender did not appear to be an influencing factor. The length of time working within the Town Hall building did seem to be a factor however, with those who had been working in the building for less than six months less likely to participate than those who had been working in the building for more than six months. Participation for those who had been working in the building for 7-11 months was higher (92%) than those who had been working in the building for 1-5 years or 6 years or more (88% and 83% respectively), suggesting that participation rates drop slightly over time. Respondents who worked casually were less likely to participate (29% participation) compared with those who worked part or full time (86% and 85% respectively).
Table 3. Characteristics of participants compared to non-participants

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Response</th>
<th>Participants (%)</th>
<th>Non-participants (%)</th>
<th>Total (100%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of time working in the Town Hall building</td>
<td>0-6 months</td>
<td>69</td>
<td>31</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>7-11 months</td>
<td>92</td>
<td>8</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>1-5 years</td>
<td>88</td>
<td>12</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>6 years or more</td>
<td>83</td>
<td>17</td>
<td>100</td>
</tr>
<tr>
<td>Age group</td>
<td>Under 25 years</td>
<td>80</td>
<td>20</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>26-44 years</td>
<td>83</td>
<td>17</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>45-64 years</td>
<td>82</td>
<td>18</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>65-74 years</td>
<td>100*</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>Gender</td>
<td>Female</td>
<td>83</td>
<td>17</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>81</td>
<td>19</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Indeterminate, intersex, unspecified</td>
<td>100**</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>Employment fraction</td>
<td>Full time</td>
<td>85</td>
<td>15</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Part time</td>
<td>86</td>
<td>14</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Casual</td>
<td>29</td>
<td>71*</td>
<td>100</td>
</tr>
</tbody>
</table>

Notes: *n=2; **n=1, ***n=7. Rows may not total to 100% due to rounding.

Respondents used a range of worm food bin locations, demonstrating that responses to the questionnaire came from across departments and locations within the Town Hall building (Table 4). Almost one third (30%) of respondents use the worm food bin in Zone 1 on the Ground Level. This is also the location of the Sustainability team. As such, results should be read with caution as it suggests that opinions from individuals in the Sustainability team are represented to a greater extent that other City of Port Phillip teams.

Table 4. Location of worm food bin used by respondents.

<table>
<thead>
<tr>
<th>Location of worm food bin</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ground level – Zone 1</strong></td>
<td>30</td>
</tr>
<tr>
<td>Ground level – Zone 2</td>
<td>11</td>
</tr>
<tr>
<td>Level 1 – Zone 3</td>
<td>22</td>
</tr>
<tr>
<td>Level 1 – Zone 4</td>
<td>11</td>
</tr>
<tr>
<td>Level 1 – Zone 5</td>
<td>15</td>
</tr>
<tr>
<td>Level 1 - Staff Lounge</td>
<td>7</td>
</tr>
<tr>
<td>Old Town Hall</td>
<td>3</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
</tr>
</tbody>
</table>

Note: Most common response is in bold font.
Respondent feelings about the worm farms

Respondent feelings about the presence of worm farms were overwhelmingly positive. Respondents were asked to select from a list of words that expressed how they felt about the presence of worm farms in the office building and were free to select all the words that applied (Figure 12). Respondents most commonly they felt pleased (65%), while half felt responsible (50%), or proud (48%) that their building had worm farms. Less than a fifth reported they felt indifferent to the worm farms (18%). Only one person (a non-participant) indicated that they felt both annoyed and worried about the initiative.

Many used the questionnaire as an opportunity to express their gratitude for the worm farm initiative,

Love it. Want to get more involved. Well done to Sustainability team (Female participant).

Thanks to everyone who helps look after it, you are doing good work that will benefit all of us! (Female participant).

We were all so interested to learn more about the worm farms at the staff sustainability tour of the town hall. It's a great initiative, well done! (Female participant).

Having the Worm food bin for composting heightens one's consciousness about this approach to waste. It's an alternative to just throwing everything in a bin & giving no thought to what happens to our waste (Female participant).
From the same list, respondents were asked to select one word which most described how they felt about the worm farms (see Figure 13). From the comparison of participants and non-participants, it is clear that more non-participants felt indifferent compared to participants. It is worth noting that ‘indifference’ does not necessarily equate to a negative emotion; rather respondents may feel impartial or neutral about the worm farms, or expect it as standard office practice. Even so, non-participants were more likely to feel positive emotions, such as pleased, responsible or proud, than indifference towards the initiative.

Those who had contributed to the foods scraps bin previously were asked to indicate why they chose to separate their food scraps for the worm farms by selecting all the applicable reasons from a list of options (Figure 14). Of these, most respondents reported they did so because ‘the worm food bin is there to use’ (87%). Participants other responses most commonly centred on the environmental benefits of composting, such as ‘it means the food scraps don’t end up in landfill’ (82%), ‘It means the food scraps can become compost’ (79%), and ‘It is environmentally friendly’ (79%).
From the same list, participants were then asked to narrow down their choice to one response (Figure 15). Well over half of participants (59%) chose the environmental benefits of composting as their number one reason; ‘It means the foods scraps don’t end up in landfill’ (25%), ‘It is environmentally friendly’ (14%), ‘It means the food scraps can become compost’ (13%) and ‘It reduces my contribution to climate change’ (7%). For one in six participants, it was the positive feelings experienced while composting that were the main reason for participation; ‘I feel I am doing something worthwhile (10%), ‘I like to feed the worms’ (4%) and ‘It feels good to do it’ (2%).

While close to all participants (87%) selected ‘the worm food bin is there to use’ as one of the reasons for participation in food separation and composting, for just under a fifth (16%), this was the primary driver. This suggests that it is extremely important that worm food bins are available in every kitchen, kitchenette, and anywhere else food waste may be disposed of (such as next to all general waste bins).
Respondent experience of participation

In order to ascertain participant experiences of both the benefits and challenges of food separation and composting, respondents were asked to state their agreement or disagreement with various statements about their experiences of food separation and composting while in the office (see Table 5 and Figure 16).

Many respondents remarked that they ‘never’ or only ‘sometimes’ experienced negative issues associated with the worm farms or separating their food scraps. The most common challenge reported, by over half of participants, was that they were sometimes (48%) or often (7%) unsure of which food scraps could be placed in the worm food bin. Less than half (43%) indicated they were ‘never’ unsure. This may be partly due to confusion around some of the signage or education associated with the worm food bins for staff.

Being unsure of which foods are appropriate for the worm food bins however, was associated with the length of time residents have been working in the Town Hall building. Similar to the slight drop in participation rates over time (Table 3, page 15), those who had been working in the building for greater than 6 months were more likely to report being unsure about which foods could be included in the worm food bins. For example, while two fifths of those new to the Town Hall building (0-6 months) (37%), reported sometimes being unsure of which foods were appropriate for the worm food bins

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Figure 15. Respondents answers to the question ‘Which is the main reason you have put food scraps in the worm food bin?’
(none reported ‘often’ being unsure), nearly three quarters of those working in the Town Hall building for 7-11 months (70%), three fifths of those working for 1-5 years (60%), and nearly half of those working in the building for 6 years or longer (48%), ‘sometimes’ or ‘often’ reported feeling unsure. This suggests that continued education about the worm food bins is not only important for new staff, but for existing staff as well.

Odour is another subjective phenomenon. While a small minority experienced that the food scraps bin ‘often’ smells (8%), less than half found it ‘sometimes’ smells (41%), and more than half reported that it ‘never’ smells (51%). There was similar variability regarding the worm food bin attracting insects or vermin; over half ‘never’ experienced this (56%), while a third ‘sometimes’ did (32%), and several ‘often’ experienced insects or vermin (13%). For experiences of odour and the presence of insects or vermin there was little difference by gender; although slightly more females reported ‘often’ experiencing smell, or insects or vermin, than males (females: 11% reported smell and 14% reported insects/vermin; males: 3% reported smell and 9% reported insects). The different perceptions and experience of odour and pests may be due to individual sensitivity, or to differences in the use or management of individual worm food bins.

Respondents who most frequently used the worm food bins located on Level 1, Zone 4, and on Level 2, Zone 5, reported ‘sometimes’ or ‘often’ experiencing smell more frequently than staff who used other bins (Table 4, page 15). For example, while between 35-43% of staff on the various other levels of the Town Hall building reported experiencing smell ‘sometimes’, 64% of those using the Level 1, Zone 4 food scraps bin reported ‘sometimes’ experiencing smell. While only between 0-13% of staff using the various other bins reported ‘often’ experiencing smell, just under one fifth (18%) of Level 2, Zone 5 staff reported ‘often’ experiencing smell.

Similarly, those using Level 1, Zone 4, or Level 2, Zone 5, worm food bins more frequently cited ‘sometimes’, or ‘often’ experiencing insects or vermin. To illustrate, 24% of Level 2, Zone 5 worm bin users often experienced insects or vermin, compared to other bin users where only between 4-13% ‘often’ experienced the issue. For those using the worm food bin on Level 1, Zone 4, 64% reported ‘sometimes’ experiencing insects or vermin compared with between 15-35% of other bin users.

Few respondents reported ever experiencing that the worm food bins were too full to put their food scraps in (95%), so while it is unlikely that overflowing or very full bins is the cause of some experiencing odour or pests, it may be that worm food bins in some locations (particularly Level 1, Zone 4, and Level 2, Zone 5) are used more frequently or managed differently than other worm food bins.
Table 5. Participant experiences of food separation and composting

<table>
<thead>
<tr>
<th>Experience</th>
<th>Never (%)</th>
<th>Sometimes (%)</th>
<th>Often (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>The worm food bin in the kitchen is too full to put my food scraps in</td>
<td>95</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>I am unsure what I can put in the worm food bin</td>
<td>45</td>
<td>48</td>
<td>7</td>
</tr>
<tr>
<td>The worm food bin smells</td>
<td>51</td>
<td>41</td>
<td>8</td>
</tr>
<tr>
<td>Separating my food scraps is time consuming</td>
<td>68</td>
<td>28</td>
<td>4</td>
</tr>
<tr>
<td>The worm food bin attracts insects/vermin</td>
<td>56</td>
<td>32</td>
<td>13</td>
</tr>
<tr>
<td>Separating my food scraps is unpleasant</td>
<td>82</td>
<td>18</td>
<td>0</td>
</tr>
</tbody>
</table>

Note: The most common response is in bold font.
Figure 16. Participant experiences of food separation and composting.
Better signage and education can address some of the concerns staff have about being unsure of what food scraps can be included in the worm food bins. While several respondents noted problems with smell or insects, these problems can easily be overcome with consistent and frequent emptying of the worm food bins. Some participants explain,

I think having worm farms at work is a great idea, and it is really easy and convenient for me to assist by putting my food scraps in the worm food bin. However, I do sit relatively close to the kitchen, and the worm food bin, and I often find little midges flying around my desk - I’m not sure if they are as a result of the worm food bins or just generally from being in close proximity to the kitchen and the bins but it is a little bit unpleasant (Female participant).

Keeping the lid closed on the worm food scrap bin would reduce the occasional odour and keep the bugs away but many people seem to think it is ok to leave the lid open unfortunately (Male participant).

Bin colour order changes too often? Once you get used to putting it in a different spot you accidentally put in wrong bins when they change (Female participant).

There may also be an opportunity to alter the worm food bin lids to make them more easily accessible or easier to use,

They are cumbersome to use - often I don't use them as I should as it takes extra effort to use them (Female participant).

The lids are awkward to open at times. It would be useful to have a small box/receptacle on staff members desk to place our rubbish which we could empty at the end of the day into the appropriate bin (Female participant).

The lid on the bin could be easier to use i.e. open or a flap that doesn't require specific opening and closing (Female participant).

Over half of the respondents (51%) agreed that having an additional bin to dispose of the food scraps the worms cannot process would be welcome. A third were either unsure (32%), and less than a fifth did not agree (17%).

It appears that the worm farms are a discussion point among most staff. Over half (59%) of respondents reported that they sometimes chat to other staff about the worm farm and several (6%) reported that they often chat to other staff about the worm farm (Table 6). Some respondents were also inspired to begin thinking about wider office and community benefits of the worm farm initiative. For example,
You should bring the school kids next door in regularly, and maybe expand this facility so it could provide for the school and ‘bubup’ and the guys on the corner. Imagine if the whole triangle were doing it! Ohh the possibilities (Participant).

Having a bin to be able to dispose of all organic waste (that cannot be put in the ‘fussy’ worms’ bin) would be fantastic (Female participant).

Some staff involved with the staff vegie garden use the worm castings and juice for fertilising the garden (Male participant).

As shown in Figure 14 (page 18), a fifth (19%) reported that one of the reasons that they put food scraps in the worm food bin was that they wanted to help make worm juice so that they could use some of it. A few (5%) often used the worm juice, nearly a quarter (21%) have sometimes used the worm juice while almost three quarters (74%) have never used the worm juice from the office worm farms. The two people involved in managing the worm farms who responded to the questionnaire, ‘sometimes’ or ‘always’ used the worm juice. However, there were still 30 respondents (25%) who were not involved in managing the worm farm who indicated they ‘sometimes’ or ‘often’ used the worm juice. Those who reported they wanted to compost so they could help produce worm juice, ‘sometimes’ also used the worm juice themselves. For example, nearly four out of five participants (79%) who reported that one of the reasons for their participation in the composting project was that they wanted to help make worm juice, also ‘sometimes’ or ‘often’ used the worm juice from the office worm farms. Respondent comments demonstrate that those who were not using the worm juice may be unsure how to access it, or whether they are allowed to,

If worm juice is available for staff to take home it could be good to have a little info about it displayed in each kitchen as a bit of a ‘feel good’ benefit to putting the right waste in the worm bins (Female participant).

Table 6. Respondent experiences of two positive aspects of office worm farming.

<table>
<thead>
<tr>
<th></th>
<th>Never (%)</th>
<th>Sometimes (%)</th>
<th>Often (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I chat with other staff about the worm farm</td>
<td>35</td>
<td>59</td>
<td>6</td>
</tr>
<tr>
<td>I have used the worm juice from the office worm farms</td>
<td>74</td>
<td>21</td>
<td>5</td>
</tr>
</tbody>
</table>

Note: The most common response is in bold font.
Reasons for non-participation

Given that nearly a fifth of staff (17%) are not participating in food separation, it is important to know why this is the case. Those not participating were asked to indicate from a list, all the reasons why they were not doing so. The reasons most commonly selected by non-participants are shown in Figure 17. The most common reasons given related to lack of knowledge about the system with half of non-participants (50%) selecting either that they didn’t know where the worm food bins are located and/or that they didn’t know that there were worm farms in the office. This reinforces the need for information about the worm farms to be given at induction as those newer to the office, and casual staff, are more likely to be non-participants (Table 3, page 15). A tenth considered that it is just habit to use the general waste bins (13%), suggesting that ensuring worm food bins are easily accessible is an important factor in encouraging new participants.

![Figure 17. Reasons non-participants are not currently putting their food scraps in the worm food bins.](image)

Questionnaire respondents were also asked to indicate from a list which food items could or could not be included in the worm food bin to be fed to the worms (see Appendix). Despite signage (Figure 4, page 8), respondents displayed some confusion as to what food items could be placed in the worm food bins. For example, while the vast majority (84%) understood that citrus could not be added to a worm farm, just under one in five were either unsure, or thought that they could. While over two thirds understood that meat should be avoided (64%), nearly a quarter were unsure (23%), and more than one in ten were incorrect in thinking that it could be placed in the worm food bins (13%). Respondents appeared even less certain about some other kinds of food items, such as bread, pasta, rice or cake, where over half (54%) believed that it could not be included in the worm food bin, while
nearly a third (29%) thought that it couldn’t, and almost a fifth (18%) were unsure. Just under half of the participants (44%) believed they could include plate scrapings in the worm food bins.

While many of these items are clearly identified on posters displayed near the worm food bins (Figure 7), some of these items are not, such as liquids, eggs, or plate scrapings. It is therefore unsurprising that many participants were unsure or incorrect regarding these items.

However, as expected, those who participated in food separation and composting had more accurate knowledge about what worms can eat than those who did not participate (see Figure 18). However, the results still demonstrate some confusion even for those who did regularly contribute. For example, while plate scrapings can generally be included in a worm farm, just under half of the participants (43%) believed they could be included. This may be because they include foods not considered appropriate for worms (such as oils, spicy foods or meat), despite the fact that in small quantities, such as leftovers from lunch, these items can indeed be successfully processed by worms.

As such, there be an opportunity to further refine the instructions given to staff around what food can or cannot be included in the worm farm. For example, while dairy products are generally not advised to be included in a worm farm, a small portion of these can be easily processed by the worm farms; such as a small slice of cheese in a left-over sandwich, or as one participant explains, the milk residue on a tea bag,

I often cannot put my teabag in as I keep it in my cup after adding milk. I also didn’t know until I was told that they [worms] don’t like cut flowers (Female participant).

Further explaining the nuances of foods which can and cannot be included, in large or small amounts, would likely increase the amount of food being diverted from landfill by staff.

Some staff also took the opportunity with the questionnaire to request further signage or explanations around some of the worm farm processes. For example,

A little sign showing the process cycle and where it all ends up would be interesting and perhaps encourage others (Female participant).

Great initiative - it may help to get staff thinking about what they could do at home. Might be possible to engage staff more such as inviting staff to worm feedings. The more staff who have visited the worm farms, the more will understand what goes in the worm bins and the benefits (Female participant).

Unclear to me as to how the worm farm got funded and how I could get some worm wee to take home (Female participant).
Sometimes I'm not sure what is suitable for the bin and so I place it in landfill. I understand to provide that information directly on the bin is not practical. Is there, or could there be, an intranet page with a comprehensive list of what can and can't be placed in this and the other types of bins? (Male participant).

Figure 18. Which of the following items can go in the worm food bin for the worms?
Recommendations

On the basis of the results of the research, the following recommendations are made:

Accessibility of worm food bins

- An important driver for participation in food separation and compost was that the worm food bin was ‘just there’ to use, it is extremely important that worm food bins are available in every kitchen, kitchenette, and anywhere else food waste may be disposed of (such as next to general waste bins). The results of the present study suggest that having more access to worm food bins may increase participation.

Education and signage

- While many respondents had a good understanding of what foods could or could not be included in the worm food bins, many respondents (including those who were participating in food separation) were unsure or incorrect in their responses. As such, there is an opportunity to further ensure that all staff understand the kinds of foods that can and cannot be included in food waste recycling.

- As most respondents have contributed to the worm food bins at some point, there is also an opportunity now to begin to discuss the nuances of which food can and cannot be processed by the worms. For example, while advertising that the worms can eat dairy may encourage unwanted contamination, communicating that small amounts of these foods are okay (such as the milk residue from a tea bag, or a left-over slice of cheese from a sandwich) will increase the quantities of food being diverted from landfill. This message however does need to be carefully communicated to avoid further confusing staff.

- Large, visual posters, displaying pictures of foods acceptable to be composted, should be displayed directly adjacent to, or on, the food waste collection points on each level of the building. This signage and messaging should be consistent across all floors and all kitchens.

- The primary driver for participation in food separation and composting who most commonly were around environmental benefits of composting, and a few respondents requested more detail around these benefits. Therefore, further messaging around the importance of composting is also recommended.
Orientating staff

- It is important to continue to communicate to new staff, and current (including casual) staff that waste diversion is part of their role as a member of the City of Port Phillip.
- All new and current staff (including casual staff) should be inducted into the use of the worm farms. The induction should include a tour of the location of the worm food bins and worm farms, an explanation of why and how to separate the food waste, an explanation of the whole building process of food waste management, and a demonstration of how they can access the ‘fruits’ of their labour (i.e. worm juice and castings).
- Orientation should include an explanation of how the worm farm was funded and the wider socio-economic benefits. Given initial funding came from the savings associated with diverting waste from landfill (the costs associated with disposal), this will also serve as an opportunity for further education about why food waste diversion is important for economic, environmental and social reasons.

Managing the worm farms

- There appears to be some opportunities to address some of the concerns staff have about the presence of the worm food bins through increasing the frequency and consistent emptying of the bins themselves. While several respondents noted problems with smell or insects, these problems can easily be overcome with consistent and frequent management of the worm food bins, such as emptying the food waste bins more frequently (particularly, but not exclusively, the worm food bins located on Level 1, Zone 4, and Level 2, Zone 5).
- It may help address some of the concerns some staff had around smell and insects if the cleaners were contracted to empty the worm food bins in the kitchens more frequently, and if all these bins have secure lids which are easy to open, close and operate.
- Once staff have a better understanding of foods that can be included in the worm food bin, and overall participation in food separation is increased, it is likely that the amount of food waste diverted from landfill will continue to increase (as participants will not be incorrectly disposing of food waste meant for the worm farms). As such, it may be necessary to increase the number of worm farms in the Town Hall building to meet demand. This could also further reduce the number or size of general waste bins required.
References


Google Earth. 2018. 156 Carlise Street, St Kilda, Victoria. Image captured August 2017. Accessed, https://www.google.com.au/maps/@-37.8682229,144.9890491,3a,75y,187.19h,101.42t/data=!3m6!1e1!3m4!1sI3m6I1eI13m4I1sn5y7dsnBgdA9alpm3AghAwI2e0I7i13312!8i6656


Appendix

Email Invitation and Questionnaire

Note: The formatting of the following questionnaire has been updated to appear in hard copy. Question wording however remains the same.
Email/letter of invitation to participants

Sent: 29th March 2017

To all staff,

As part of the City of Port Phillip’s office composting project, worm farms have been installed in the St Kilda Town Hall car park. An important part of this project is to seek your feedback. Whether you have food scraps in the office or not, we would appreciate 5 minutes of your time to complete this short survey.

To access the survey please click here (or paste the following into your web browser: http://opinio.online.swin.edu.au/s?s=18346)

For more information please contact [name of City of Port Phillip officer] [phone number].

Kind regards,

[name of City of Port Phillip officer]

Dr Belinda Christie, Centre for Urban Transitions, Swinburne University of Technology

Privacy Statement

Participation is entirely voluntary. The information provided in this survey will be used by the City of Port Phillip to assist in the provision, planning and development of City of Port Phillip services, and by Swinburne University of Technology for research purposes. Information provided by you will only be used for the purposes for which it was collected, and will be kept confidential. All responses are anonymous and no IP addresses are tracked. Any feedback made via this questionnaire may be published and used as part of a Council or Swinburne University report or publication. Council is collecting this feedback for the purpose of informing the project. Providing contact details is optional. Your details will be used to provide you with project updates and will be kept confidential.

Demographic snapshot

Demographic data allows Council and Swinburne University researchers to assess whether it is providing all City of Port Phillip staff with an opportunity to become involved and be heard. The personal information provided in this is being collected for the purpose of providing a demographic snapshot of contributions to this project. Your personal information will be used solely by Council and Swinburne University for this primary purpose or directly related purposes. Demographic data may be published and used as part of a Council or Swinburne University report or publication. Providing us with this information is optional.

For more information contact Council’s Privacy Officer via ASSIST on [phone number].
City of Port Phillip food waste questionnaire

Q1: What do you usually do with your food scraps (including tea bags and coffee grounds) in the office?

- I don’t have any food scraps in the office
- Put them in the worm food bin in the kitchen
- Take them home with me
- Put them in the landfill bin in the kitchen
- Other (please specify)

If you have chosen "other", please specify:

Q2: Have you ever placed food scraps in one of the green worm bins?

- Yes
- No
- Unsure

Note: if you have answered/chosen items [2, 3] in question 2, skip the following question

Q3: Please select all the reasons why you have ever put food scraps in the worm food bin. Select as many as apply.

- A. The worm food bin is there to use
- B. I feel I am doing something worthwhile
- C. I was encouraged to by a colleague
- D. I was encouraged to by a manager
- E. It means the food scraps don’t end up in landfill
- F. I want to help make worm juice, so I can use some at home
- G. It is convenient
- H. I like to feed the worms
- I. It reduces my contribution to climate change
- J. It is environmentally friendly
- K. It means the food scraps can become compost
- L. It feels good to do it
- M. Other (please specify)

If you have chosen "other", please specify:

Q4: Which of the above is the main reason you have put food scraps in the worm food bin? Please select below the letter which corresponds to the main reason.

- A
- B
- C
- D
- E
- F
- G
- H
- I
- J
- K
- L
- M
Q5: Are you continuing to put food scraps in the worm food bin?

- Yes, every work day
- Yes, less than once a week
- No

Q6: Please indicate how often you experience the following:

<table>
<thead>
<tr>
<th>Reason</th>
<th>Never</th>
<th>Sometimes</th>
<th>Often</th>
<th>Always</th>
<th>Not applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>The worm food bin in the kitchen is too full to put my food scraps in</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I chat with other staff about the worm farm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I am unsure what I can put in the worm food bin</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I have used worm juice from the office worm farms</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The worm food bin smells</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Separating my food scraps is time consuming</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The worm food bin attracts insects/vermin</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Separating my food scraps is unpleasant</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Q7: Please tick all the reasons that you are not currently putting food scraps in worm food bin. Select as many as apply.

- A. I didn’t know there were worm farms in the office
- B. I take my food scraps home
- C. It’s just habit to put my food scraps in the rubbish bin
- D. It is too much effort to separate my food scraps
L. Separating my food scraps is unpleasant
E. I don’t see the point
M. Separating my food scraps is time consuming
F. The worm food bin smells
N. The worm food bin attracts insects/vermin
G. The worm food bin gets full, so there isn’t any room for my worm food scraps
O. I am unsure what I can put in the worm food bin
H. Its not my responsibility
P. Other people in the office don’t use the worm food bin
Q. Other (please specify)

If you have chosen "other", please specify:

Note: if you have answered/chosen item {1, 2, 3, 4} in question 5, skip the following question

**Q8:** Which of the above is the main reason you are not currently putting your food scraps into the worm food bin? Please select below the letter which corresponds to the main reason.

- A
- B
- C
- D
- E
- F
- G
- H
- I
- J
- K
- L
- M
- N
- O
- P
- Q

**Q9:** Please indicate which of the following items can go in the worm food bin for the worms.

<table>
<thead>
<tr>
<th>Item</th>
<th>Yes</th>
<th>No</th>
<th>Not sure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Citrus scraps</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Onion/garlic scraps</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vegetable scraps</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fruit scraps (excluding citrus)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plate scrapings</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meat scraps</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bread/pasta/rice/cake</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Milk/cheese/yoghurt</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eggs/egg shells</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paper towel/paper/cardboard</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flowers/plant clippings</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coffee grounds</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tea leaves/tea bags</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liquids</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Q10: Which of the following words describe how you feel about having the worm farms in the St Kilda Town Hall building? Select as many as apply.

☐ A. Indifferent  ☐ E. Proud  ☐ B. Annoyed
☐ F. Worried  ☐ C. Bemused  ☐ G. Responsible
☐ D. Pleased  ☐ H. Other (please specify)

If you have chosen "other", please specify:


Q11: Which of the above is the one word which most closely describes how you feel about having the worm farms in the St Kilda Town Hall building? Please select below the letter which corresponds to the word.

☐ A  ☐ B  ☐ C  ☐ D  ☐ E  ☐ F  ☐ G  ☐ H

Q12: Would you like an additional food scraps bin for the food scraps that cannot be put in the worm food bins?

☐ Yes  ☐ No  ☐ I'm not sure  ☐ Other (please specify)

If you have chosen "other", please specify:


Lastly, some information about you.
The following questions help us to understand what groups of people have responded to the survey.

Q13: Are you involved in managing the worm farms?

☐ Yes  ☐ No  ☐ I don't know

Q14: How long have you worked in in St Kilda Town Hall building?

☐ 0-6 months  ☐ 7-11 months  ☐ 1-5 years  ☐ 6 years or more

Q15: Which office worm food bin do you use most often?

☐ I don't use the office worm food bins  ☐ Ground level - zone 1
☐ Ground level - zone 2  ☐ Level 1 - zone 3
☐ Level 1 - zone 4  ☐ Level 1 - staff lounge
☐ Level 2 - zone 5  ☐ Old Town Hall
☐ Other (please specify)
If you have chosen "other", please specify:

Q16: Please select your age group.
   - Under 25 years
   - 26-44 years
   - 45-64 years
   - 65-74 years
   - 75 years or older

Q17: What is your gender?
   - Female
   - Male
   - Indeterminate / Intersex / Unspecified

Q18: Do you work full time, part time or on a casual basis?
   - Work full time
   - Work part time
   - Casual

Q19: Are there any other comments or suggestions you would like to make regarding the office worm farm or how you manage your food scraps while at work?

Thank you

Thank you for taking our survey. A summary of the results will be made available to you.

Q20: If you would like to receive a summary of the results, please enter your email address below: