

Report on a trial of emergency compost toilets

Wellington Regional Emergency Management Office

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Acknowledgements

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We would also like to thank the Ministry of Civil Defence and Emergency Management's (MCDEM) Resilience Fund for providing the funding for the trial. Finally, thank you to all members of the project team and their organisations for their support of the trial.

Executive summary

This report documents the findings from a trial of emergency compost toilets conducted by the Wellington Regional Emergency Management Office (WREMO) in 2012.

The Canterbury earthquakes (2010 and 2011) highlighted the vulnerability of sewerage systems to disruption during an earthquake. In Canterbury emergency toilets were a combination of long drop, port-a-loos and chemical toilets, and some significant disadvantages to these toilets were noted at the time. One alternative emergency toilet would be compost toilets, and this trial was undertaken to determine if compost toilets were a viable option.

Participants were provided with a pre-fabricated emergency compost toilet and basic supplies and were asked to use the toilets exclusively for four weeks, simulating an emergency situation where sewerage systems were disrupted and water supply is limited.

The trial demonstrated that households and workplaces could safely and hygienically use a compost toilet exclusively for a month. Compost toilets therefore should be promoted as a viable toilet option in an emergency where sewerage systems are disrupted.

As a result of the findings, the report makes three recommendations:

1. That the use of compost toilets as an option in an emergency is promoted through the Wellington Region, by:
 - a. Providing information to the public on how to build and use an emergency compost toilet.
 - b. Identifying how compost toilets could be deployed in an emergency.
 - c. Assist in the promotion of compost toilets to the public, as a viable option to use during an emergency.
2. That an emergency management sector guideline for the promotion and use of compost toilets in an emergency is developed and distributed nationwide.
3. That WREMO works with all councils in the Wellington Region to plan for sewerage disruptions and emergency toilet options, including the use of compost toilets.

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1 Introduction

An emergency compost toilet trial was undertaken in October and November 2012 to determine whether compost toilets could be a viable alternative to port-a-loos or chemical toilets in an event that sewerage systems are disrupted. The trial was funded by the Ministry of Civil Defence and Emergency Management (MCDEM) Resilience Fund.

This report outlines the trial methodology, assesses the potential benefits, and provides an analysis of the findings. It concludes with the recommendations of the Wellington Regional Emergency Management Office (WREMO).

2 Background

2.1 Canterbury experience

The Canterbury earthquakes (September 2010 and February 2011) highlighted the vulnerability of sewerage systems to disruption during an earthquake. Temporary toilet solutions in Canterbury were mainly a combination of backyard long drops, port-a-loos and chemical toilets. The Canterbury experience revealed some significant disadvantages to port-a-loos and chemical toilets, as shown in Table 2.1

Table 2.1: Key difficulties of port-a-loos and chemical toilets during Canterbury earthquakes¹

Port-a-loos	Chemical toilets
Supply unable to meet demand	Use of chemicals. Misconception that chemicals are making waste “safe”. Some of the chemical used are only odour suppressants.
Some people were required to walk quite a distance to use a port-a-loo	
Significant odour issues	One size fits all approach. Often the seats are designed overseas and are quite small and were not suitable.
Easily and regularly vandalised	
Safety issues. Some were tipped over while people were using them	
Lack of water and hand washing facilities (often not working)	Takes a significant amount of time to source enough toilets to meet needs
Labour intensive as they had to be pumped twice a day	Waste needs to be dumped in large communal tank, which users found difficult. Potential health issues from presence of tank on streets.
Public health issues. Not being cleaned regularly for the number of people using them.	
Impact on psychological well-being of community with the large number of people using one port-a-loo for extended periods of time.	Tanks needed to be pumped regularly, often daily.

The Canterbury experience also highlighted the lengthy restoration times of sewerage systems. A situation that is likely to be exacerbated in Wellington by the significant access difficulties expected after a significant earthquake².

2.2 The compost toilet project

In 2012 WREMO was approached by compost toilet proponents, Matthew King of GreenEarth Developments and Gary Williams of Waterscape, to discuss compost toilets as a suitable option for the Wellington region in an emergency. Compost toilets were proposed as an option following the Canterbury earthquakes and received some support and uptake at a community level.

¹ Anecdotal comment (community meetings in Christchurch)

² Lifeline Utilities Restoration Times for Metropolitan Wellington following a Wellington Fault Earthquake (Wellington Lifelines Group Nov 2012).

Prior to the trial, the advantages the benefits of the compost toilet system in an emergency were identified as:

- Environmentally friendly, do not use chemicals
- Smaller load factor (i.e. a smaller number using each toilet), which reduces the public health (hygiene) risk
- Easily put together with readily available materials
- Storage containers (wheelie bins) do not need to be emptied daily, making them less labour intensive, in terms of pick up and disposal of waste
- Can be used in the home - maintenance and cleaning the responsibility of the individual
- Requires minimal water.

A four week trial of compost toilets to determine if they were a viable alternative to chemical toilets or port-a-loos and as such a more sustainable waste management solution in a disaster was proposed. A successful application for funding through the Resilience Fund was made to MCDEM.

The trial was led by WREMO with the project team including GreenEarth Developments, Waterscape and Wellington City Council (WCC) staff.

2.3 Project philosophy

The central project philosophy of the trial was that of safety and support. WREMO wanted the participants to feel safe and supported during the course of the trial. Participants were provided with information on toilet use, composting and hygiene. For hygiene reasons participants were allowed to use their normal bathroom facilities for hand washing and cleaning themselves. Weekly site visits were undertaken to check all was well at the participating sites.

3 Methodology

3.1 Recruitment of participants

The target was to recruit ten to fifteen groups, ideally a mixture of households and workplaces with a broad demographic and located in Wellington City.

Initially, social media³ and print media were used to attract participants. An online survey, Survey Monkey (www.surveymonkey.com), was used to outline the trial and gather information around potential participants and their experience with the possible toilet options (Appendix 1). The potential participants also met with WREMO staff, to discuss the trial and what would be involved should they participate.

On 23 August 2012 a ‘teaser’ was posted to Facebook, asking people to consider how they would manage waste in an emergency (Figure 3.1). The following day a request for volunteers for the trial was posted (Figure 3.2). The second post provided a link to the online survey. Eight expressions of interest in the trial were received.

Figure 3.1: Facebook posting on 23 August 2012.



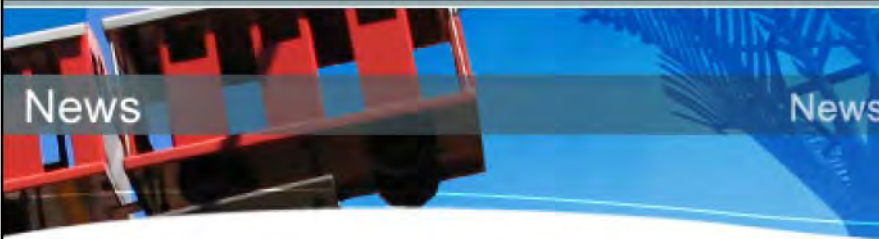
³ For more information on WREMO’s social media presence see Section 3.4.2

Figure 3.2: Facebook posting on 24 August 2012.



On the 27 August 2012, a request for participants was placed on the Wellington City Council (WCC) website, shown in Figure 3.3. The article discussed waste management in a disaster, and referred potential participants to the WREMO Facebook page. From Facebook they could link to the online survey. The same article was placed in the WCC 'Our Wellington' section of the Dominion Post on 28 August 2012, Figure 3.4.


Figure 3.3: Wellington City Council website, news article on 27 August 2012.



Compost Toilet Trial

27.08.12

Ten Wellington households will trial a new compost toilet system to see if it will provide a better alternative to chemical toilets or portaloos in an emergency.



A home-made sign in Christchurch asks for help in the form of a portable toilet

One of the biggest problems for Christchurch following the February 2011 earthquake was the damage to the city's sewerage system.

People used portaloos and chemical toilets, but there were significant problems with these, including the time it took to source enough toilets, waiting times for portaloos and the difficulty older people had emptying heavy chemical toilets. Compost toilets can be easily constructed at home and placed in your bathroom or outside your home, so there is no waiting to use a toilet.

They provide an environmentally friendly alternative to other types of toilets. Some families in Christchurch who still don't have working flush toilets have started using compost toilets. Compost toilets are made from particle board - two buckets stand inside the box with toilet seats on top.

One toilet is used for urine and the other for waste. After using the waste toilet, wood shavings or chips or leaves are placed on top. The toilet is then emptied into a wheelie bin. The waste is layered with sticks, grass and soil to help absorb the odour. The wheelie bin is collected every few weeks for composting. The urine bucket is emptied onto a corner of the garden each day where it acts as fertiliser.

The Wellington trial is being carried out by the Wellington Region Emergency Management Office (WREMO) and local councils. If it goes well, compost toilets may be used in future emergencies. If you are interested in being part of the trial visit:

[Wellington Region Emergency Management Office - Facebook website](#)

Figure 3.4: Our Wellington (Dominion Post) article on 28 August 2012.



A further request was posted to Facebook on 3 August 2012 (Figure 3.5). As a result of this posting three additional expressions of interest were received.

Figure 3.5: Facebook article on 31 August 2012.



Of the initial twelve potential participants, six were excluded for the following reasons:

- Two were outside the trial zone (i.e. Wellington City Council).
- Two had family members who worked in childcare. On advice from Wellington City Council's Public Health Unit we declined these expressions of interest based on potential risk.
- One withdrew from trial following discussion with her family.
- One withdrew following further information being provided by WREMO staff during a post sign up interview.

To ensure we had enough participants to meet the minimum target of ten, the recruitment for participants was extended to include:

- Wellington Regional Council staff through an advertisement on the staff intranet
- WREMO volunteers through their established network. These are people who have completed WREMO volunteer training and have an on-going relationship with WREMO.

Eight expressions of interest were received from WREMO volunteers. One potential participant was declined on grounds of ill health in the family and one person decided not to proceed with the trial.

This resulted in twelve participants, and although one later withdrew due to a family illness eleven participants commenced the trial. Table 3.1 summaries the process to identify participants for the trial.

Table 3.1: Summary of the recruitment process

Date	Action	Number of responses	Number that actual participated in the trial
23 August 2012	Facebook post (teaser)	N/A	N/A
24 August	Facebook post (request for volunteers)	8	6
27 th August	Wellington City Council website	0	0
28 th August	Newspaper article		
31 st August 2012	Facebook post (follow-up request for volunteers)	3	0
3 September 2012	WREMO Volunteers	8	5
3 September 2012	Greater Wellington Regional Council intranet	0	0

The participants were located between Newtown and Tawa (Figure 3.6), within Wellington City Council boundaries.

Figure 3.6: Map showing the distribution of trial participants in Wellington City



3.2 Information gathering tools

It was critical that as much information was gathered from the participants. Therefore, a number of methods were used to collect information before, during and after the trial.

3.2.1 Surveys

Undertaking a series of surveys enabled changes in participant's perceptions to be tracked during the course of the trial. All surveys were completed using the online survey tool Survey Monkey (www.surveymonkey.net). Copies of the surveys are available in Appendix 2.

3.2.2 Diaries

Participants were asked to keep a diary of their experiences during the trial. A copy of the diary is available in Appendix 3.

3.2.3 Site visits

A WREMO researcher visited each site on a weekly basis, in part to interview participants. Information (including photographs) from the site visits was recorded using the ipad application iAuditor (www.safetyculture.com.au/iAuditor/). The iAuditor application allows a user to design and tailor forms to gather information from site visits (Appendix 4). While designed for auditing, the applications flexibility allowed for information from site visits (including photos) to be collated into a report per site visit. This report could be distributed (via email) to relevant members of the project team if needed.

3.2.4 Debrief

A participant debrief was held on 5 December 2012. This was designed to allow the project team and participants share their experiences of the trial, discuss the design and use of the system and also to reflect on their application in an emergency.

3.3 The trial

3.3.1 Pre-trial briefing

On 27 September 2012 a pre-trial briefing was held the WREMO office. The purpose of the briefing was:

- to provide background information on compost toilets, composting and the project scope;
- to provide information and hygiene tips in relation to using the compost toilet;
- to introduce the project team and provide participants with an opportunity to meet each other and ask questions.

A 'how to use' guide for the emergency compost toilets was given to participants, see Appendix 5.

The briefing was videoed and a copy made available to those who were unable to attend. The participants who were unable to attend were also provided with a briefing at the time the compost toilet unit was installed.

3.3.2 Installation

Installation of the compost toilets was carried out during the 23 - 26 October 2012, the week before the trial commenced.

The materials used in the trial were based on materials that would be readily available to a household and community in an emergency. All participants were provided with the following:

- toilet unit (ply board frame and two buckets)
- storage container (in this case a wheelie bin)
- straw and wood shavings
- storage bucket (for shavings) and a cup
- gloves and sanitiser gel
- diary and 'how to use' guides

Appendix 6 provides detail of the material and information supplied.

3.3.3 Trial

The trial itself commenced on 29 October 2012 and ran for four weeks, until the 23 November 2012. During the trial participants had to exclusively use the compost toilet. A WREMO researcher visited the sites weekly, to ensure all was well at the site, both with the toilet and with the participants. As per section 3.2.3 the site visits also provided an opportunity to gather information from the participants.

A summary of the week's site visits was sent to both the project team and the participants.

3.3.4 Pickup

Pickup of the wheelie bins, toilets and any leftover material was completed on 26 November 2012. Wheelie bins were collected in a van loaned by the Wellington City Council's CitiOps. The van was fitted with a partition between driver and storage space, and could hold up to six wheelie bins. The toilets were unassembled; they and all unused material were and collected in a WREMO Ute. A team of three people was able to collect all material in the day.

Wheelie bins were delivered to the Southern Landfill where the contents were disposed of by the CitiOps team.

4 Findings

4.1 Recruitment of participants

Eleven households and workplaces participated in the trial (Table 4.1). The participating households provided a wide range of ages and backgrounds, although no teenagers participated.

Table 4.1: Demographics of participants in the emergency compost toilet trial

Participant	Type	No. People	Age Range (Year)				
			0 - 4	5 - 15	16 - 34	35 - 64	65+
A	Household	1 ⁴			2		
B	Household	5	1	2		2	
C	Household	6		4		2	
D	Workplace	2 ⁵			2	2	
E	Household	2				2	
F	Workplace	1				1	
G	Household	5			5		
H	Household	3				3	
I	Household	2				2	
J	Household	2			2		
K	Household	1					1

People who already had a relationship with WREMO (through Facebook or as WREMO volunteers) were much more likely to participate in a WREMO project. The follow-up posting to the original message did trigger an additional response, and would be worth using again if identifying volunteers or participants for future trials was necessary.

The use of a newspaper ad and website (intranet and internet) were not an effective means of identifying participants. However, they did raise the profile of WREMO and its projects. Later media interest (section 4.8) in the trial was due to the newsletter advertisement (Figure 3.4).

When attempting to attract volunteers to a trial or project use a variety of different methods.

Follow up posts on social media did gain an additional response.

People with a relationship to WREMO are more likely to volunteer for a WREMO project.

Even if print media does not gain an immediate response it does raise the profile of WREMO and may lead to later media interest.

⁴ Initially both household members signed on for trial, but only one ended up participating.

⁵ Initially all six members of the workplace signed on for trial, but in the end it is estimated that in fact only two people completed the full trial (see section 4.2.5).

For a small trial of up to 15 people, the mechanisms used were sufficient to recruit enough participants. If additional participants were required, it would have been necessary to use additional community networks and/or broaden the catchment area, for example allowing Porirua City and/or Hutt City residents to participate.

4.2 Delivery and collection

For most participants it took less than 15 minutes to deliver the materials, assemble the unit and set up the wheelie bin. For those users who had not attended the briefing an additional 5 – 10 minutes was required to brief the participants and allow them to ask any questions. Supplies for two sites (including wheelie bins) could be fitted into a WREMO Ute (Ford Ranger).

One participant requested a 'split' unit, i.e. separate boxes for the two buckets and two other participants were unable to fit the units in their existing bathrooms and had to place them in a spare room. They were provided with heavy duty plastic liners to line the bottom of the units.

All material for the 'split' unit could be fitted into a single 240 L wheelie bin (Figure 4.1), this could be an appealing choice to people wishing to include a compost toilet in their emergency preparedness kit. A standard unit did not quite fit into a wheelie bin.



Figure 4.1: A 240 litre wheelie bin containing an unassembled compost toilet (split unit) and all material supplied for the trial. This material could last a two person household six to eight weeks.

Several of the participants requested that the toilet unit was not assembled, wishing to assemble it themselves. All were able to do this successfully in less than 5 minutes. All wheelie bins were set up for the users, Appendix 6.

A few of the sites had good drive on access, however many were less accessible. Several were accessed by steps, ranging from 10 to 45. One site was only accessible by a path of approximately 300 metres combined with a few steps. Figure 4.2 shows access to some of the sites. The use of wheelie bins, flat pack frames and light mulch material meant that only one or two people were able to carry material to all sites.

Figure 4.2: Access to two of the sites in the trial, showing some of the challenges faced delivering and collecting material.



At the sites more difficult to access, the weight of the wheelie bins was monitored to ensure they could be safely removed at the end of the trial. At the end of the trial all of the wheelie bins were relatively light (20 – 25 kg for a family of six), this meant that the participants had minimised the amount of liquid in the bins. The wheelie bins provided a distinct advantage in manoeuvrability despite the challenges of access to some Wellington houses

Wheelie bins were a good choice as storage container. They provide an enclosed space and their wheels made them easy to manoeuvre when delivering and collecting material.

While site access was variable, material was able to be delivered to and collected from sites with relative ease.

4.3 Using the compost toilet

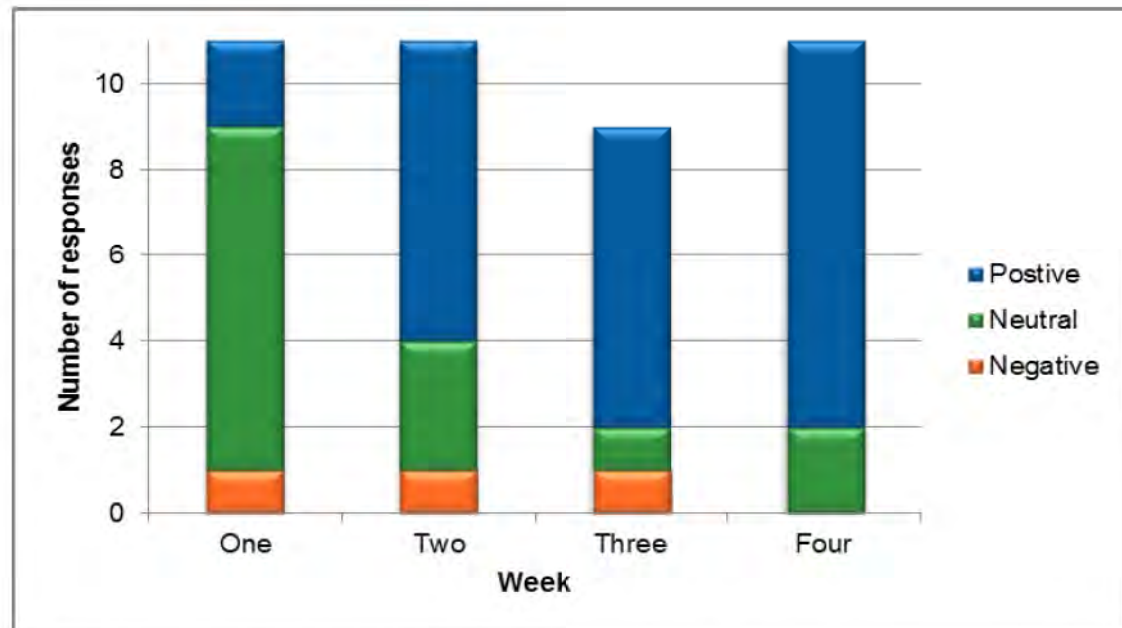
Information gathered during the course of the trial revealed a number of common themes reported by the participants.

4.3.1 Overcoming initial apprehension

Many of the adult participants reported initial apprehension at using the compost toilets, especially on the first day of the trial. Several admitted to delaying use of the toilet, but as one participant said ‘when you have got to go, you have got to go’.

Once participants had overcome the initial apprehension, they rapidly adapted to the compost toilet. The site visits revealed how comments and evaluation of toilets in the first week were mostly neutral, by week two they were mostly positive, and by the last week they were all positive or neutral (Graph 4.1). Comments in the diaries reveal a similar trend.

Graph 4.1: Evaluation of the overall experience of using the compost toilets based on site visit data (Appendix 7).



Some participants were also concerned about storing the faecal material on their property. One benefit of the wheelie bins provided was that they had lids and were able to be placed in discrete locations, preferably shaded. One participant did move their bin from its initial location to one that was not visible from the house.

Most users will be apprehensive using an emergency compost toilet. However, for most these fears will be overcome in the initial few days.

Some users may need additional support and encouragement to overcome their initial fears.

4.2.2 Changing habits

The use of the compost toilet required participants to learn some new habits: remembering to place toilet paper in the correct bucket and remembering not to use the flush toilet.

Female users and children in particular reported that remembering to place all toilet paper in the faeces bucket was a challenge. It was also important to remind guests and other users to do this (Figure 4.3). Participants reported that it took two to three weeks to learn this new habit.

Figure 4.3: Left photo shows a label reminding users what should go into the urine bucket. Right, photo of the same label in week two, clarifying where toilet paper should go.



It was also important to remember to not use the normal flush toilet as this may be disrupted during an emergency. Several participants reported forgetting in the middle of the night and defaulting to their usual toilet. To overcome this, some participants used physical reminders on toilet doors (Figure 4.4), while others tried a 'do not use' sticker (Figure 4.5) on their actual toilet seat. It was also mentioned that in emergency they would tape the lid of their toilet seat down to prevent accidental use.

Families reported that some children grew bored or rebelled and returned to using the flush toilet. In an emergency where sewage services are disrupted it would be important to use reminders that the flush toilet is out of operation.

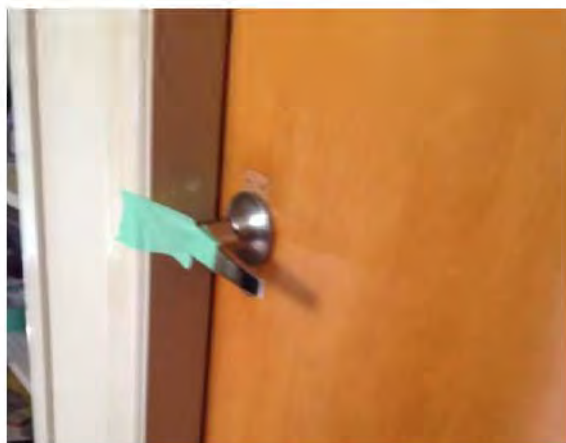


Figure 4.4: A toilet door with a physical reminder that the flush toilet inside is not for use.



Figure 4.5 A flush toilet with a reminder not for use. Children were trying to peel the sticker off so that they could return to using this toilet.

Users will need to allow a few weeks for new habits to be remembered, such as placing all paper in the faeces bucket.

In an emergency preventing access to use a 'normal' toilets may be needed. Good signage and clear instructions to all family and visitors is needed.

4.3.3 Children

A number of children used the compost toilets, including two families (total of five children, aged 3 to 11), visitors and children of workplace users. One of the methods to get children engaged and use the compost toilet was to get them to decorate the unit. Figure 4.6 shows a toilet that the household children (aged 3 and 5) decorated to indicate which bucket was to be used for which function. This demonstrates they had an understanding of why there were two toilets and the decoration helps to show child visitors. The youngest child was so excited by the decorated toilet that they crept in and used the toilet before the trial's official start date.

Figure 4.6: Photo of a compost toilet decorated by household children (aged 3 and 5).



In one household the children tried to remove the sticker from the flush toilet, so they could use that toilet again (Figure 4.5), or in the case of one child, they just returned to using the flush toilet. On-going engagement, including discussions on why the trial was occurring and renaming the toilets 'earthquake toilets' resulted in more support of the trial by this age group.

Younger children were enthusiastic users, many liking the wood shavings use in the toilet. One household reported a regular two year old visitor would insist on using the toilet when arriving and before leaving. However, both families reported that the gap (of 3 – 4 cm) between the bucket and outer unit was sufficient for both male and female children to miss the urine bucket and cause spills (with additional cleaning). This was resolved by using timber at the base (Figure 4.7) to raise the buckets and reduce the gap.



Figure 4.7: Photo of the timber inserts in the base of a compost toilet, these were used to raise the height of the buckets, reduce the gap between seat and bucket and the potential for spills.

While most of the children appeared happy that the trial was over, one of the youngest reported that flush toilets were boring and they missed adding wood shavings to the toilet. One of the oldest children also reported they preferred the compost toilet, as it was 'more green'.

Children can use an emergency compost toilet successfully. However, there does need to be good engagement from the outset and thought to combat the end of the novelty factor.

Being allowed to decorate a toilet can be a way to engage their enthusiasm, as well as clearly indicate the functions of the two separate buckets.

Raising the buckets to reduce the gap may be necessary for families with young children.

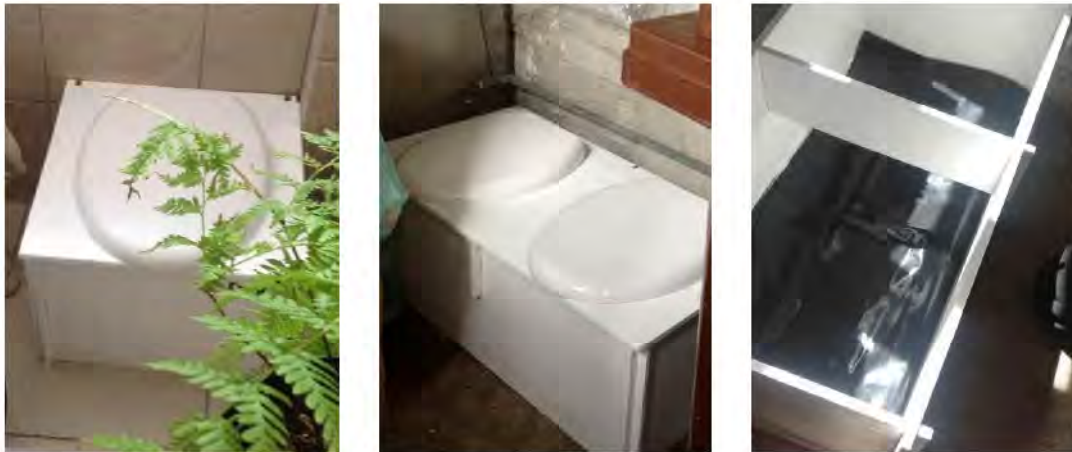
4.2.4 Flexibility

One of the advantages of the emergency compost toilet designed by Green Earth Developments was its flexibility. Units were able to be adapted to suit the different situations of the participants (Figure 4.8):

- split units, allowing fit into smaller spaces;
- lined units located in spare rooms,
- located in laundries or outbuildings, where no internal space was available.

This flexibility would be important in an emergency, enabling users to adapt the system to suit their needs.

Figure 4.8: The flexibility of the emergency compost toilet. Left: Part of 'split' toilet installed in narrow space in a bathroom. Middle: Compost toilet located in an outside laundry. Right: A lined unit located in spare room of the house.



During the course trial, and at the debrief (Appendix 8) a number of possible improvements were identified:

- making the units higher (raising the 400 mm to the standard toilet height)⁶
- improving the finish of the units
- providing the means to raise the buckets when used by young children
- adding bracing to ensure plyboard frame lid sits better.

Green Earth Developments are incorporating this feedback into future designs of their emergency compost toilets.

Different participants preferred different mulch types, some preferring the wood shavings and others damp leaf mulch (see section 4.3 for further information). In an emergency users may need to material that is readily available (e.g. garden supplies, garden leaf litter), but should be encouraged to try different mulches to find one that works best for them.

⁶ Making a higher version for the less abled was also proposed. The design could be modified to do this, but also conventional means to modify toilets, such as toilet seat risers, will also fit the standard design emergency compost toilet.

Flexibility is a key benefit of the emergency compost toilet design, allowing the units to adapt to the situation of each user. Flexibility also means that user can incorporate into their own environment, e.g. paint it or use a toilet seat from their existing toilet to make it aesthetically pleasing.

Users may need to trial different types of absorbent material to find one that suits them.

4.3.5 Workplaces

Two workplaces participated in the trial and whilst the sample was not large enough to draw significant conclusions there were a number of observations made.

The single person workplace quickly adapted to the emergency compost toilet, although for privacy reasons they emptied their buckets at times when no other people were in the building.

This participant recommended the promotion of a compost toilet for small business, as it would aid their ability to restart work. Interestingly, their priorities for restoration of services in the event of an emergency were identified as electricity and internet; water (providing they had access to bottled water) and sewerage were a lower priority.

For the workplace with a number of participants, several staff members who had initially indicated that they would participate in the trial did not take part. The non-participation in the trial related to a privacy and 'over-familiarity' concern as people did not want the next user to know, or see, what they had done. There were also concerns expressed at the intimacy caused when a work colleague, rather than an anonymous person, had to empty the buckets.

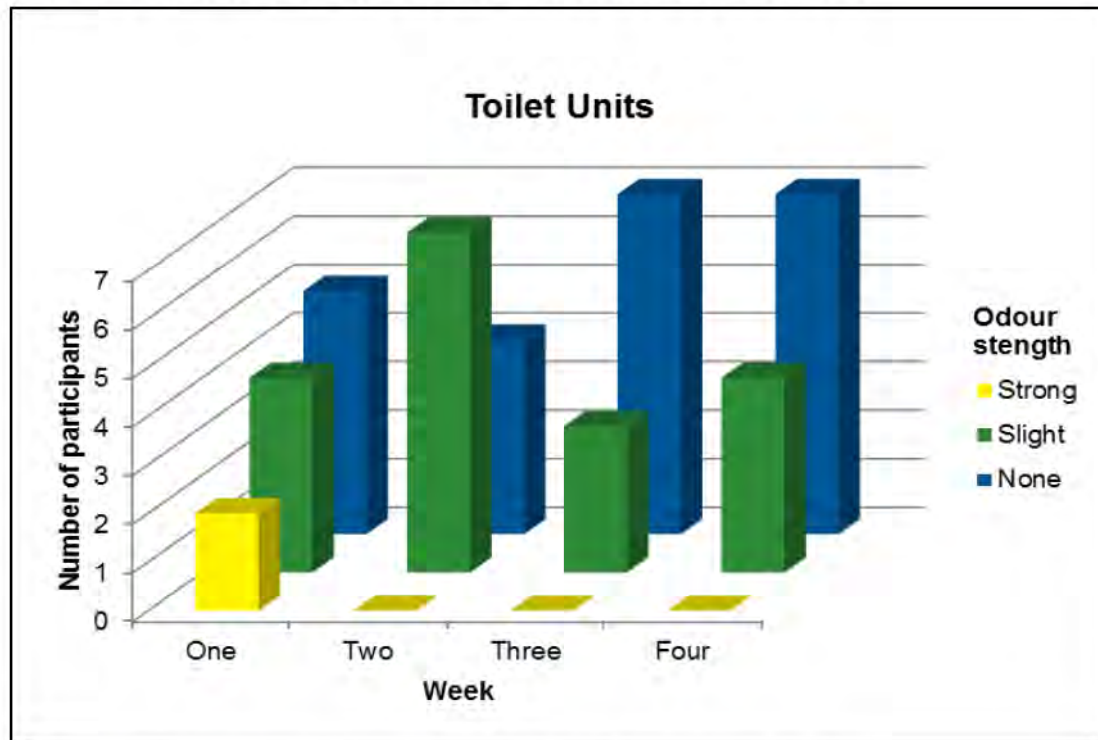
Those who did not participate in the trial did comment that the toilets were a good idea. Many would implement them in their homes and in the case of a disaster or emergency some of their concerns from the trial would be over written by need.

The emergency compost toilet may work for business, though users may find this brings unwelcome intimacy to work relationships. Providing additional units and allowing users some anonymity may aid in the toilets acceptance in the workplace.

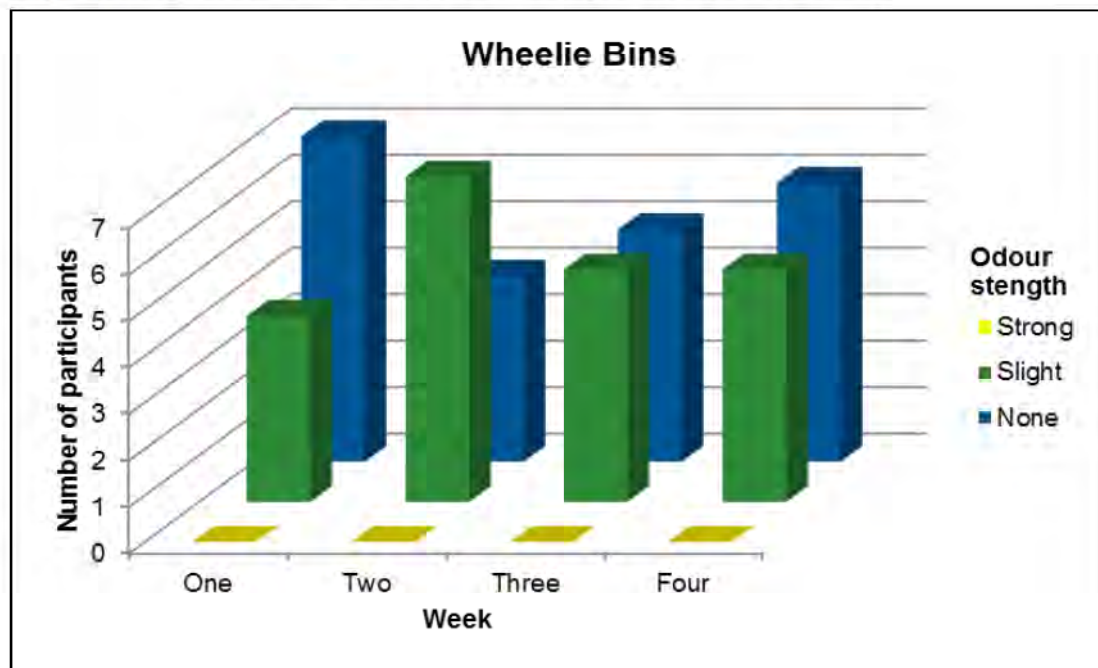
4.4 Smell and odour

The potential for unpleasant odours was a fear of many participants (and the WREMO researcher). The site visits revealed that aside from the first week the smell from the toilets was only ever described as slight (Graph 4.2), while for the wheelie bins the odour was only ever slight (Graph 4.3). This is due to the separation of urine from the faeces, keeping toilets seats closed and the use of material to cover the faeces when in the wheelie bin.

Graph 4.2: Reported smell from the toilet units (Table A.7.1 for raw data)



Graph 4.3: Reported smell from the wheelie bin (Table A.7.1 for raw data)

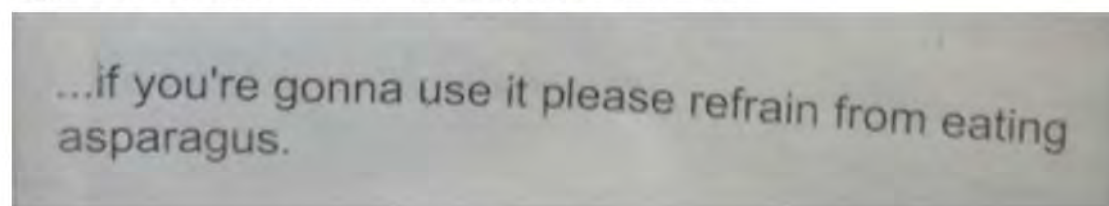


Smells from the toilets never became consistent and unpleasant odours. Many participants commented on the smell from the absorbent material (wood shavings and straw), some describing the toilet as having an agricultural smell.

Others commented on the smell from the urine bucket. This was the case with the two locations that recorded a strong smell in the first week, both were a urine odour. This was resolved by diluting the urine with water and regular emptying of the urine bucket.

Participants did report that asparagus season (which coincided with the trial time) did contribute in some case to the urine smell (Figure 4.9).

Figure 4.9: A seasonal reminder to avoid potential smell issue



Compost toilets need a material that is airy (i.e. allows air to circulate). At the time of installation we provided all users with wood shavings to use as a covering for the faeces bucket, and for additional covering in the wheelie bin. One participant, familiar with compost toilets, found this mulch too airy and thought it may be a contributing factor to allowing the smell of the toilet to be noticeable in other parts of the house. They used denser damp leaf mulch, which was subsequently provided to most participants in week two. Other participants found the smell from the leaf litter unpleasant inside their houses and preferred the wood shavings.

Many of the participants did take steps to add a pleasant smell to the compost toilet. Some added essential oil to the straw, others lit perfumed candles or added perfume diffusers (Figure 4.10) and one participant added sprays of rosemary from their garden to the straw.



Figure 4.10: A compost toilet set up with a perfume diffuser.

The wheelie bins produced very little odour. Site visits revealed that when the lid was down there was no smell and even when opened the smell was never characterised as being stronger than 'slight'. The lack of smell was attributed to:

- minimising the amount of urine and other liquids in the wheelie bin
- wheelie bins being located in shady locations
- adding additional straw/wood shavings to the wheelie bin when emptying the faeces bucket
- in some cases adding the leaf mulch as a capping layer.

If used as per the instructions and emptied regularly there is little to no smell from the compost toilet. Separation of the urine and faeces prevents the development of a 'long-drop' smell.

Ideally storage containers (such as wheelie bins) should be located in the shade.

Additional mulch may be needed to 'cap' layers in the storage container to reduce any odour.

4.5 Cleaning, cleanliness and hygiene

Throughout the trial the toilets and wheelie bins were maintained in clean state by the participants. Participants used their regular cleaning products to clean the buckets, though at least one had added a disinfectant spray to the routine. The diaries (Appendix 9) reveal that most participants report that the toilet felt hygienic throughout the trial.

Most participants reported an increase in cleaning, from a little to half an hour, and additional tidying due to spilled wood shavings. Many participants liked that the units were painted white as this gave a feeling of hygiene. During the course of the trial some participants did report that their units marked e.g. a stain from a coffee cup inadvertently placed on the unit gave the impression that the unit was not clean.

At the pre-trial briefing, participants were introduced to the 'straw nest' concept to line the faeces bucket (Figure 4.11). Participants reported this worked well as buckets were easy to empty and there was little mess left in the bucket. Some participants also added a newspaper lining to the faeces bucket before creating the straw nest to aid in emptying.



Figure 4.11: A bucket set up with a 'straw nest'.

Reviewing the diaries (Appendix 9) most participants emptied their urine bucket daily, though one participant only emptied their bucket once a week. Families and the more fastidious people emptied their faeces bucket daily, while some couples emptied the faeces buckets every three to four days.

Participants were surveyed regarding approximately how often they cleaned their toilets; and once the trial was underway whether they felt the frequency of toilet cleaning increased, stayed the same or decreased (Table 4.2). Most people reported an increase in the amount of cleaning needed, though one participant reported a decrease.

Table 4.2: Frequency of toilet cleaning and any change from regular cleaning schedule.

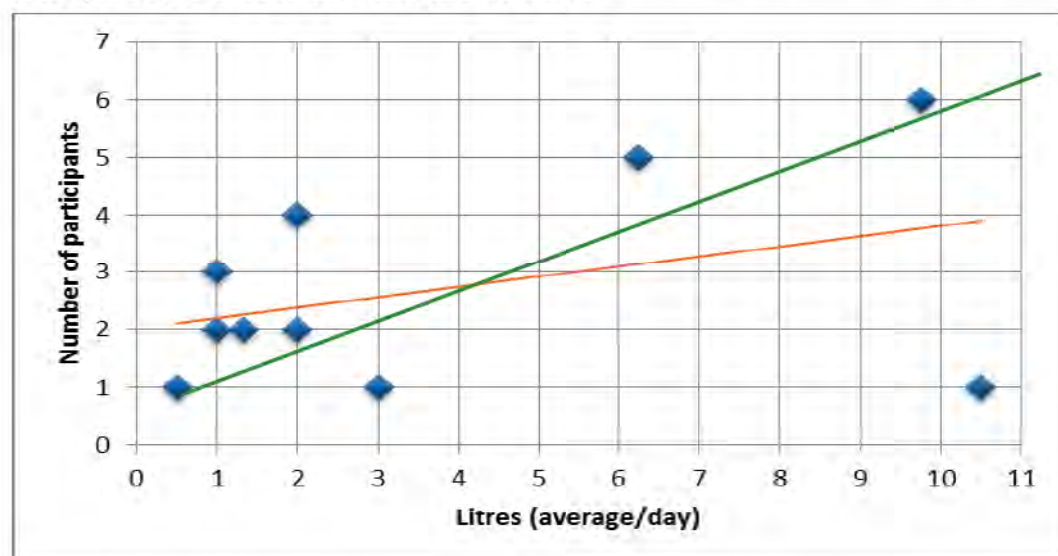
Survey	Frequency of toilet cleaning			Change from regular cleaning schedule		
	Daily	Every couple of days	Weekly	Increase	Same	Decrease
Pre-trial	2	3	3	-	-	-
Mid-trial	3	3	2	4	3	1
Post-trial	3	3	2	3	4	1

Creating a 'straw nest' makes emptying of the faeces bucket easier and helps with cleaning.

Most participants emptied the urine bucket daily. The frequency that the faeces bucket was emptied varied depending on number of people and fastidiousness.

Approximately half the participants reported an increase in their regular cleaning schedule.

Graph 4.4 Average daily water usage from compost toilet trial. Orange trend line for all participants: green trend line with outlier removed



4.6 Water

Participants recorded their daily water use, excluding water for hand washing, in the diaries (Appendix 9). They were also asked about their water use at site visits (Appendix 7) and in the surveys (Appendix 10). The results for these were comparable, though the site visit information was the most comprehensive.

The average daily water used is shown in Graph 4.4. The orange trend line is calculated for all participants; while the green trend line is with the outlier (Participant K) removed to better show average expected water use.

Graph 4.4 shows that water use per person, per day does vary, but a minimum of 1 litre per person per day is required, and a more conservative recommendation would be 2 litres per person per day. This is solely for using and cleaning the system.

Many of the participants voluntarily limited their water use, so as to better replicate an emergency situation. One participant collected rain water (Figure 4.12) and used that as their only source of cleaning and diluting urine.

While the compost toilets use little water in comparison to normal flush toilets (a dual flush system averages 3 to 6 litres per flush); they do rely on the user having a store or supply of water to use in the toilet. The Ministry of Emergency Management and Civil Defence currently recommends that a household stores drinking water for at least three days and recommends at least three litres/per person/per day (www.getthru.govt.nz).



Figure 4.12: A selection of vessels set up to collect rain water from the participant's

Any promotion of the compost toilet as part of a household's emergency kit will need to include the provision for storing additional water, noting that the water does not need to be of drinking water quality.

Allow 2 litres of water per person per day, noting that some users may need additional amounts.

Users will need to consider the need to access or store additional water to use the compost toilet in an emergency.

Case Study – Participant K

One user was extremely anxious at the beginning of the trial, reporting that on occasion in the first week they would wash their hands after thinking about the toilet. They found the smell of the materials and the contents of the wheelie bin distressing in the first week. This user needed additional support, especially in the first ten days to get through the trial.

Some of the methods they used to get through the trial were:

- Covering the units when not in use
- Emptying, cleaning and setting up the faeces bucket immediately after use.
- Emptying the urine bucket every day
- Eating a more vegetarian diet
- Ensuring material in the wheelie bin was kept in a pile (rather than spread out)
- Ensuring the material in wheelie bin was well covered in shavings and straw
- Adding a layer of leaf litter or garden mulch to the wheelie bin each week to 'cap' the material
- Using gloves and sanitiser when emptying and cleaning the buckets

As a result this participant used more water than the others and need additional supplies of wood shavings, straw, leaf mulch and some mulch. This person was the only one to fill their (120 litre) wheelie bin during the trial and a replacement bin was supplied for the last week of the trial.

Despite their initial concerns, this user reported throughout the trial that the toilets felt hygienic; by the tenth day their overall comment in the diary became "All OK". Though they admit to counting down the days till the trial end, they conclude their diary with the entry:

*Thx for the opportunity to take part, face my fears, learn to cope
This is the least awful option in the absence of flushing loos
In the event I'd need equally good support health info, advice, supplies
and wheelie exchange.*

This user demonstrates that a person who is initially anxious can overcome and successfully use a compost toilet. To do so, they need additional support, material and water especially in the first few weeks of use while the user is adapting to the system.

Any rollout of the compost toilets in an emergency will need to consider the requirements of extremely anxious users, but with additional support and materials these users can successfully use compost toilets.

4.7 Resources

Table 4.4 lists the material that was supplied to participants at the time of installation and additional material supplied throughout the course of the trial. Table 4.3 lists the amount of material collected at the end of the four week trial, and estimate of the bin fullness at this time.

Table 4.3: Amount of material leftover at completion of the trial; estimates of the fullness of the wheelie bin

Participant	No. People	Bin Size	Amount of material leftover			Bin fullness
			Shavings (large bag)	Straw (large bag)	Leaf Mulch (small bag)	
A	1	240 L	$\frac{1}{2}$	$\frac{3}{4}$	1	$<\frac{1}{2}$
B	5	240 L	$\frac{1}{2}$	$\frac{1}{2}$	0	$\frac{3}{4}$
C	6	240 L	1	$\frac{1}{2}$	0	$\frac{3}{4}$
D	2	240 L	$1\frac{1}{2}$	$\frac{3}{4}$	0	$<\frac{1}{2}$
E	2	240 L	$\frac{2}{3}$	$\frac{1}{2}$	0	$\frac{1}{2}$
F	1	120 L	$\frac{3}{4}$	$\frac{3}{4}$	0	$\frac{1}{2}$
G	5	240 L	1	$\frac{1}{4}$	0	$\frac{3}{4}$
H	3	240 L	$\frac{1}{3}$	$\frac{1}{3}$	0	$<\frac{1}{2}$
I	2	240 L	$\frac{1}{2}$	0	0	$\frac{1}{2}$
J	2	240 L	$\frac{1}{3}$	$\frac{1}{3}$	0	$\frac{1}{3}$
K ⁷	1	2 x 120 L	0	$\frac{3}{4}$	0	full

Even after a four week trial the majority of bins were only up to $\frac{1}{2}$ full, even households with 5 – 6 people participating had not filled their bins. The exception was participant K who had filled their initial 120 litre wheelie bin by the third week of the trial (see Case Study, page 25 for further discussion).

Based on the information in Tables 4.3 and 4.4, the material each participating household or workplace had used, and then average material used per person could be calculated (Table 4.5). An estimate of how long trial participants could have used their compost toilets given the initial material they were supplied with and the capacity of their wheelie bin are shown in Table 4.6.

⁷ Given some of the concerns around odour and hygiene early in trial by this participant they were advised to add as much of the remaining material as deemed necessary to their wheelie bin

Table 4.4: Material supplied to participants, both at time of installation and additional material supplied at site visits

Participant	No. People	At installation			Additional supplies			
		Wheelie Bin	Wood shavings (large bag)	Straw (large bag)	Wheelie Bin	Wood shavings (small bag)	Straw (small bag)	Leaf Mulch (small bag)
A	1	240 L	1	1	-	-	-	1
B	5	240 L	2	1	-	-	-	1
C	6	240 L	2	1	-	-	-	1
D	2	240 L	1	1	-	-	-	-
E	2	240 L	1	1	-	-	-	1
F	1	120 L	1	1	-	-	-	1
G	5	240 L	2	1	-	-	-	1
H	3	240 L	1	1	-	-	-	1
I	2	240 L	1	1	-	-	-	1
J	2	240 L	1	1	-	-	-	1
K	1	120 L	1	1	120 L	2	2	2

Table 4.5: Estimates of the amount of material used during four week trial

Participant	No. People	Bin volume (when collected)	Amount of material used			Material used/per person ⁸	
			Wood shavings (large bag)	Straw (large bag)	Leaf Mulch (small bag)	Wood shavings	Straw
A	1	120 L	1/2	1/4	0	1/2	1/4
B	5	180 L	1 1/2	1/2	1	1 1/3	1/4
C	6	180 L	1	1/2	1	1 1/6	1/4
D	2	120 L	1/2	1/4	0	1/4	1/8
E	2	120 L	1 1/3	1/2	1	1 1/6	1/2
F	1	120 L	1/4	1/4	1	1/4	1/4
G	5	180 L	1	3/4	1	1 1/5	1/6
H ⁹	3	120 L	2 2/3	2 2/3	1	1 1/3	1 1/3
I	2	120 L	1/2	1/2	1	1/4	1/2
J	2	120 L	1/2	1/2	1	1/4	1/2
K	1	240 L	1/2	1 1/4	2	2	2 2/3

⁸ We did not calculate the average leaf mulch used per person as most participants used the leaf mulch as a capping layer in the wheelie bin, so use was not proportional to number of people.

⁹ This household were provided with one small bag of leaf litter; they preferred this material for use in their toilet and used additional supplies from their garden. This has been factored into the calculation of the material used per person

Table 4.6: Estimate of the length of time participants could have managed in an emergency based on the initial material supplied to them (Table 4.4)

Participant	No. People	Bin Size	Weeks
A	1	240 L	8
B	5	240 L	6
C	6	240 L	6
D	2	240 L	12
E	2	240 L	6
F	1	120 L	6
G	5	240 L	6
H	3	240 L	8
I	2	240 L	8
J	2	240 L	8
K	1	120 L	3 ¹⁰

The information from graph 4.4 and tables 4.5 and 4.6 provided a recommended minimum resource requirement for a two person household for six to eight weeks use of an emergency compost toilet:

- 240 L storage container (such as a wheelie bin)
- 1 large bag dry mulch (such as wood shavings)
- ½ large bag straw
- ½ large bag damp mulch (such as leaf litter or compost)
- 2 – 4 litres water per day

All of this material (if a split unit was used) can be fitted into a 240 L wheelie bin.

A two person household, for six to eight weeks use of an emergency compost toilet would need as a minimum:

- compost toilet system (frame + 2 buckets)
- 240 L storage receptacle (or wheelie bin)
- 1 large bag wood shavings (or dry mulch)
- ½ large bag straw
- ½ large bag damp mulch (such as leaf litter or compost)
- 2 - 4 litres of water per day

¹⁰ Actual, not estimate.

4.8 Survey Results

Four surveys were undertaken as part of the trial:

- Survey of previous experience of emergency toilet options (included in registration of interest in the trial).
- Pre-trial survey
- Mid-trial survey
- Post-trial survey

The results of these surveys are reported in Appendix 10.

4.8.1 Previous use of compost toilets

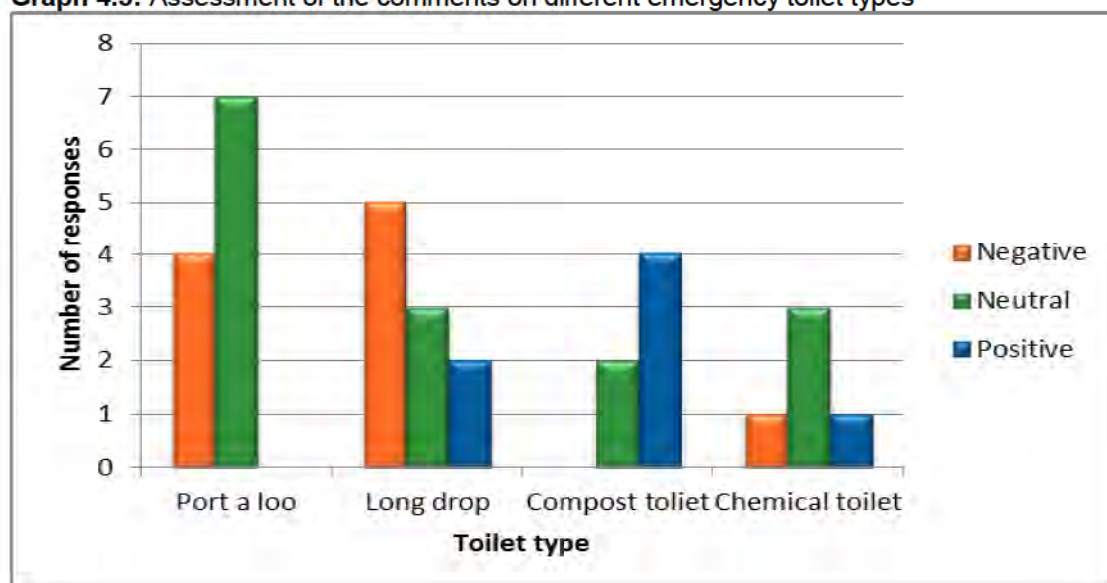
Most participants had previously used long drops and port-a-loos, but prior to the trial appropriately half of the participants had previously used a compost toilet (Table 4.7).

Table 4.7: Participants previous use of potential emergency toilet options

Toilet type	Previous use	
	Yes	No
Chemical toilet	5	6
Compost toilet	6	5
Long drop	10	1
Port-a-loo	11	0

If a participant had previously used a toilet option, they were asked to provide comment (Table A10.1, Appendix 10). Comments were reviewed and assessed as being positive, negative or neutral (neither negative or positive, or both negative and positive), a summary of the comments is provided in Graph 4.5.

Graph 4.5: Assessment of the comments on different emergency toilet types

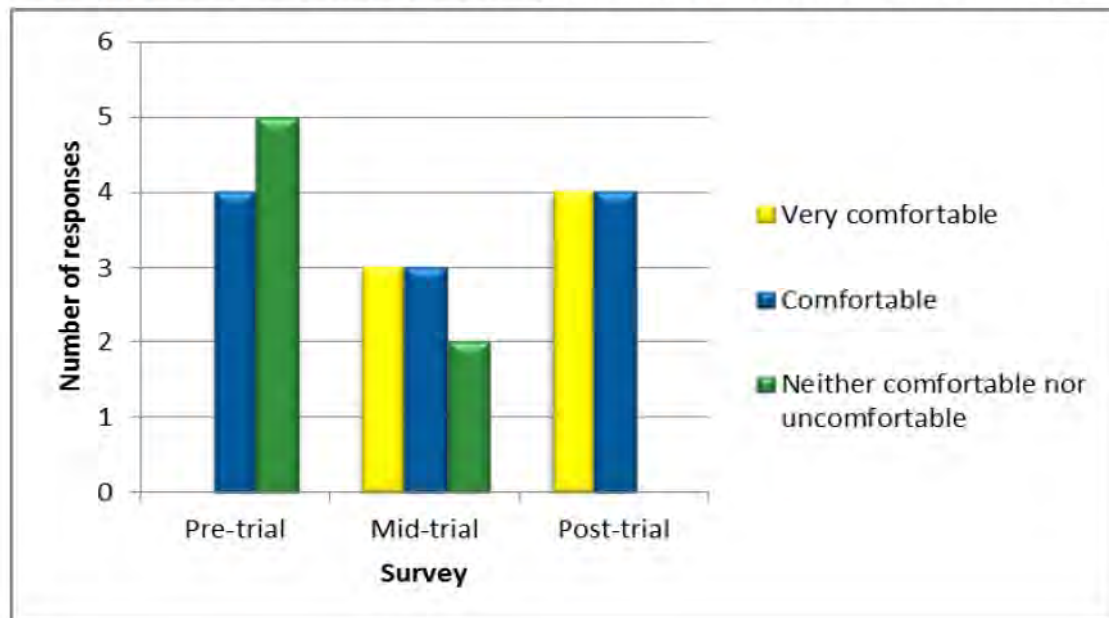


Graph 4.5 shows that long drops received the most negative comments, with many focused on the smell. Comments for port-a-loos and chemical toilets were mostly neutral, the actual comments mostly focused on when people had used them. Compost toilets received the most positive comments, and no negative comments. This positive assessment of the compost toilets may be due to a pre-existing bias – persons who have had a negative experience with compost toilets would be unlikely to register for trial to test their effectiveness as an emergency toilet option.

4.8.2 Ease of use of compost toilets

Graph 4.6 shows that prior to the trial all participants considered that the compost toilet would either be comfortable or 'neither comfortable nor uncomfortable' to use. By the end of the trial all participants reported that the toilets were either comfortable or very comfortable.

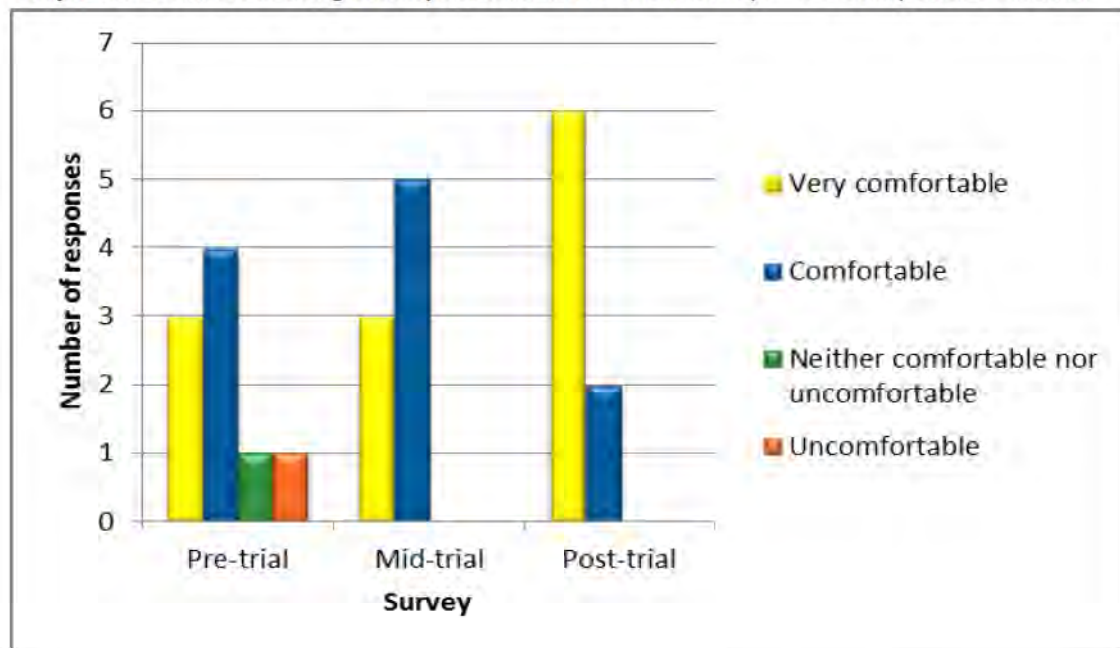
Graph 4.6: Ease of use (potential and actual) as reported throughout the course of the trial



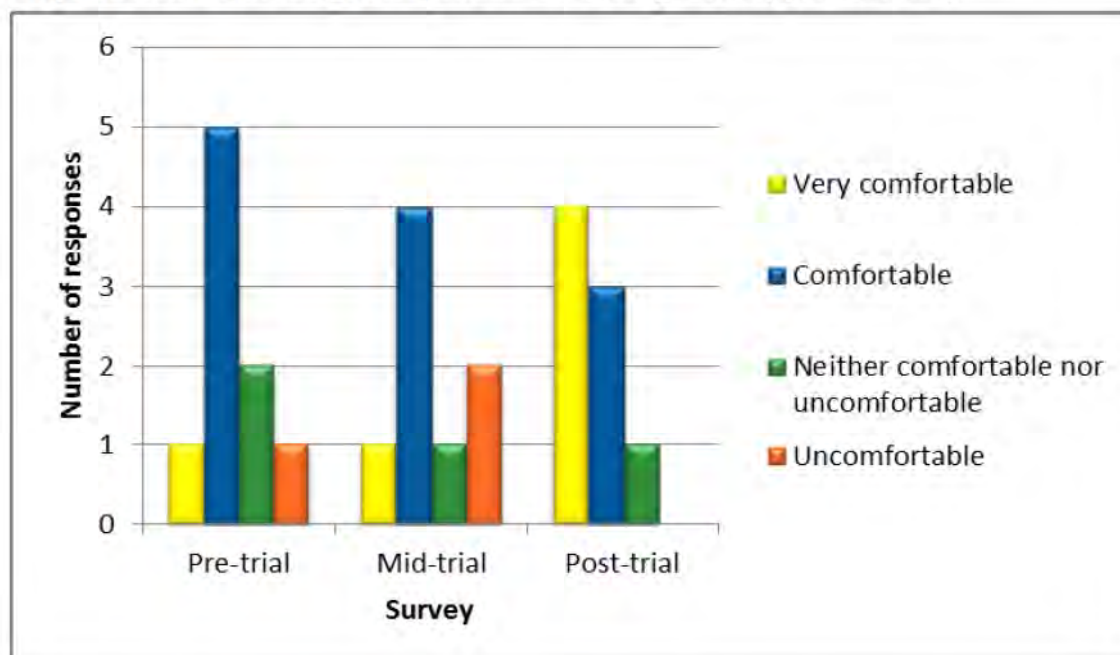
4.8.3 Use of compost toilets after a disaster

Participants were surveyed regarding their comfort at the thought of using a compost toilet in an actual emergency, both in the short term (Graph 4.7) and longer term (Graph 4.8).

Graph 4.7: Comfort of using a compost toilet in the short term (1 – 2 weeks) after a disaster



Graph 4.8: Comfort of using a compost toilet in the longer term (up to 3 months)

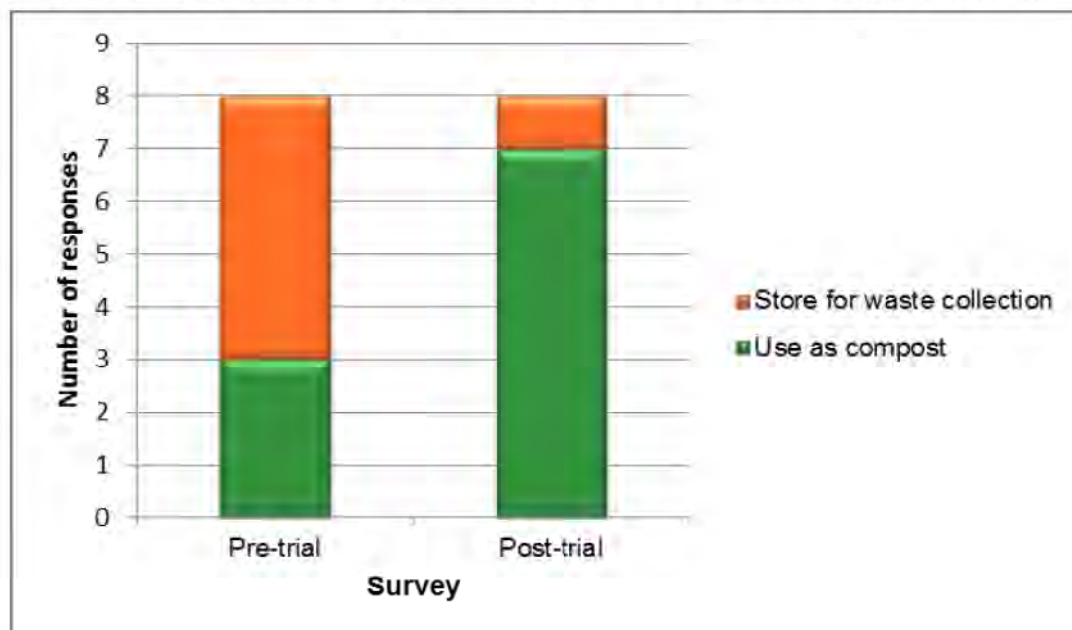


Results show that as the trial progressed participants grew more comfortable with the use of a compost toilet as an emergency toilet option, particularly as a longer term (up to three months) system.

4.8.4 Collection of waste material

For the trial all solid waste material was collected and disposed of at the Wellington Southern Landfill. In the pre and post-surveys participants were asked about preferred methods of waste disposal in an emergency, either stored for waste collection or used as compost (Graph 4.9).

Graph 4.9: Comparison of emergency toilet preferences, both in the long and short term



Prior to the trial most people preferred that the waste would be stored for waste collection, however by the end of the trial the majority of respondents would have been willing to use the material as compost. In an emergency this means that the material actually collected may be much less than generated with households becoming accustomed to the idea of handling their own faecal material.

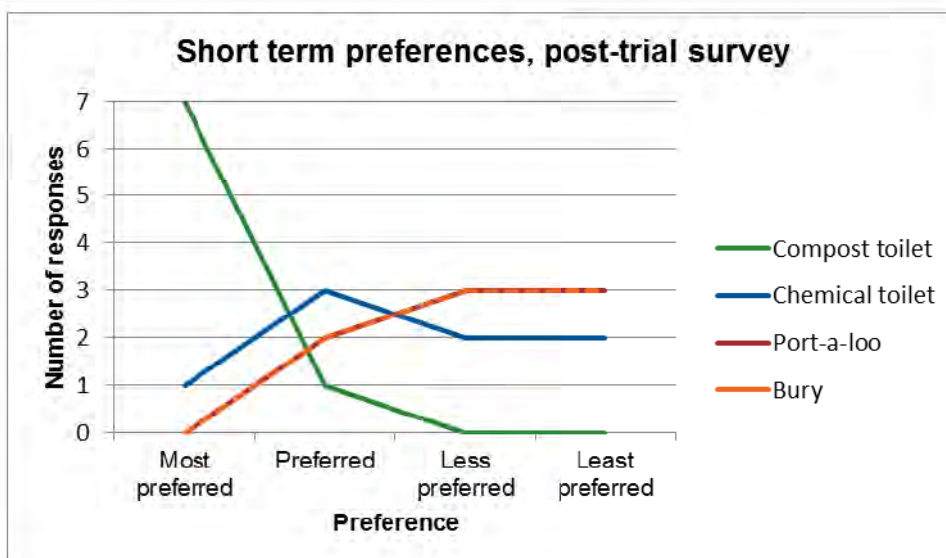
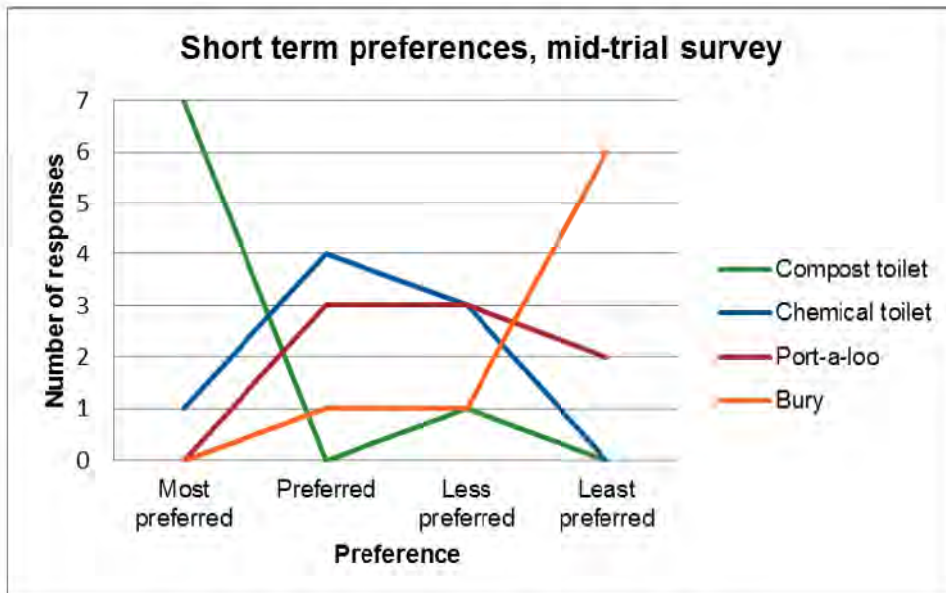
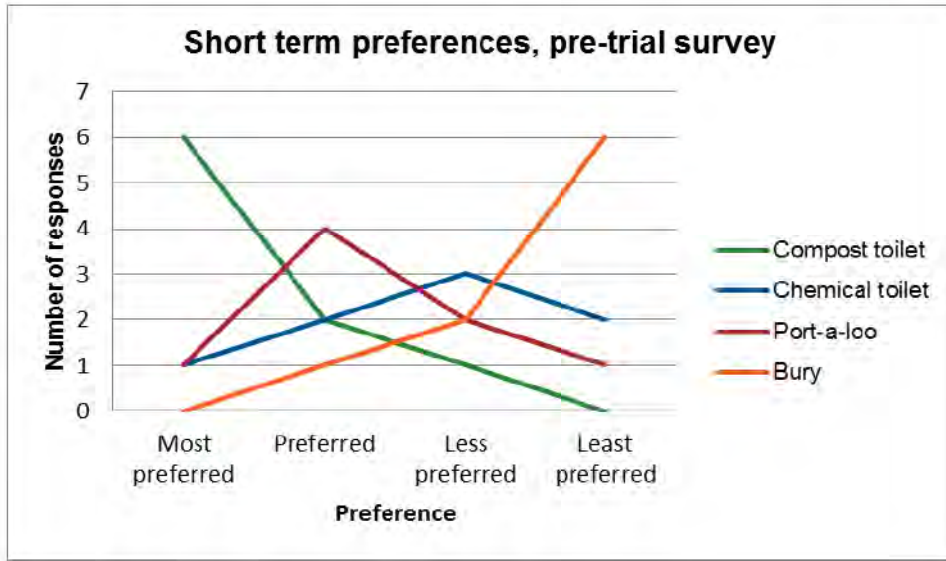
Comments in the survey results (Appendix 10) showed that participants would want clear guidance on how to compost this material and be able to use it safely.

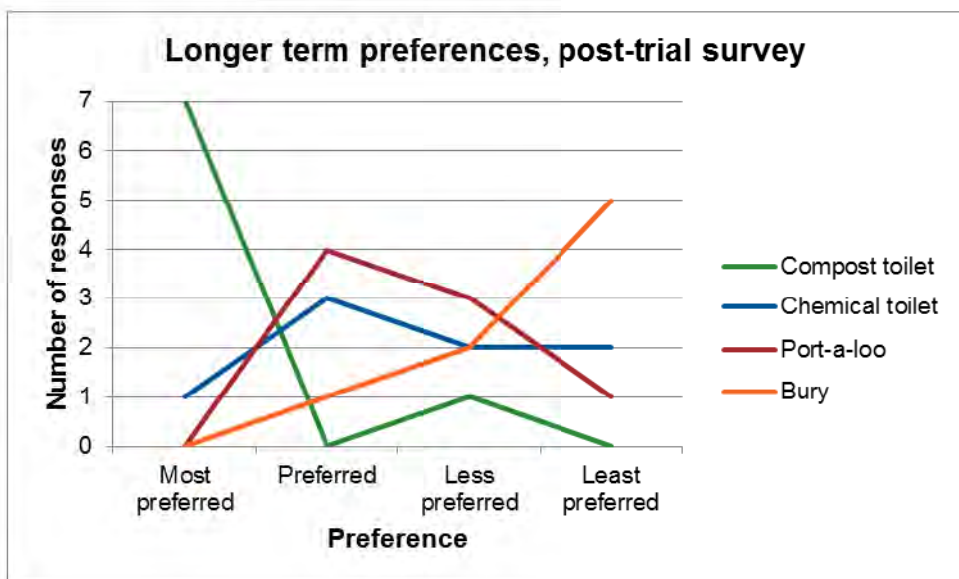
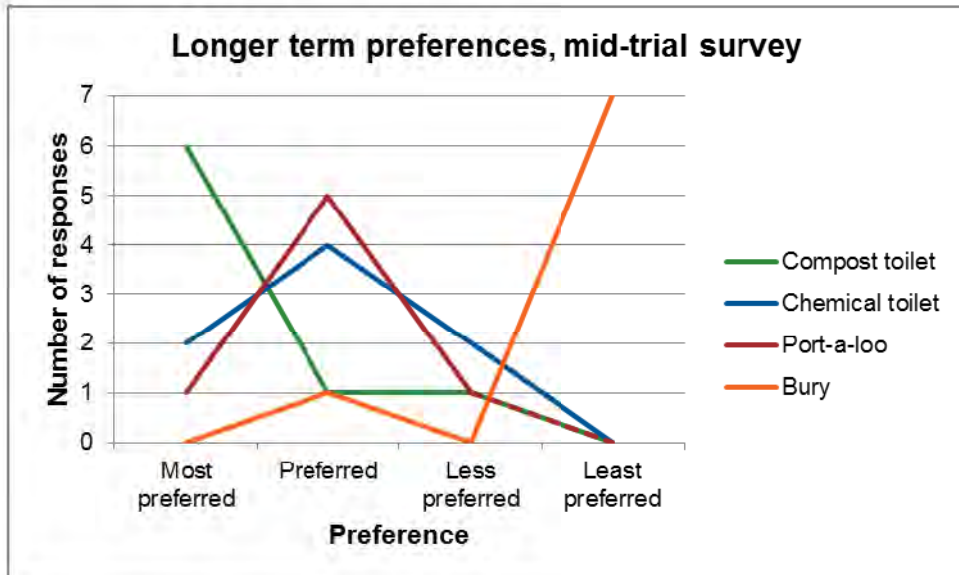
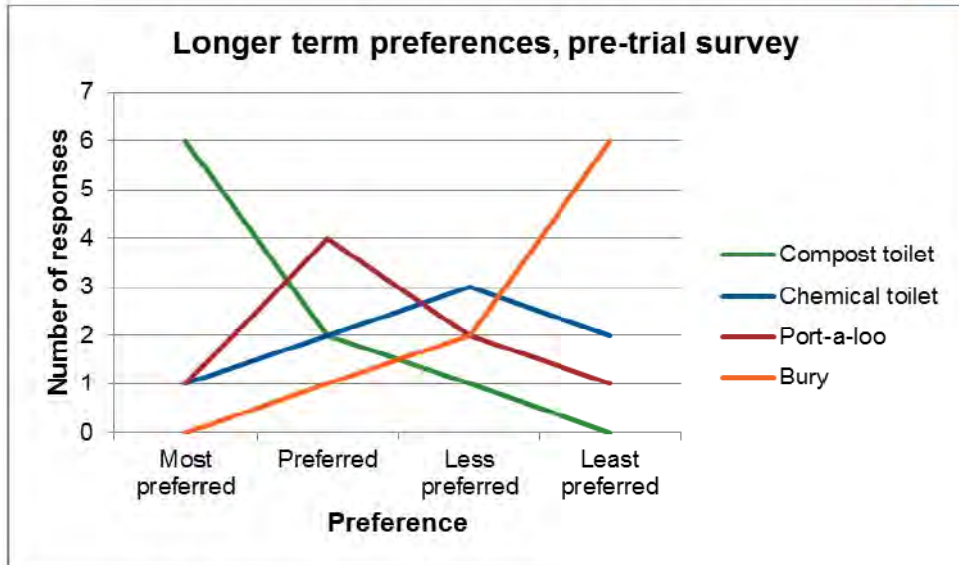
Many users of a compost toilet may compost and use the waste material generated, even if initially against the idea. In an emergency clear guidance on how to do this safely is required.

4.8.5 Emergency toilet preferences

Participants were asked to rank four possible emergency toilet options (compost toilet, chemical toilet, port-a-loo or burying waste in plastic bags in their own garden) from most to least preferred, in both the short term (1- 2 weeks) and longer term (up to 3 months). Graphs 4.10 – 4.16 show the findings of these surveys with compost toilets as the preferred emergency toilet option for both the short and long term.

Graphs 4.10 – 4.16: Comparison of emergency toilet preferences, both in the long and short term.

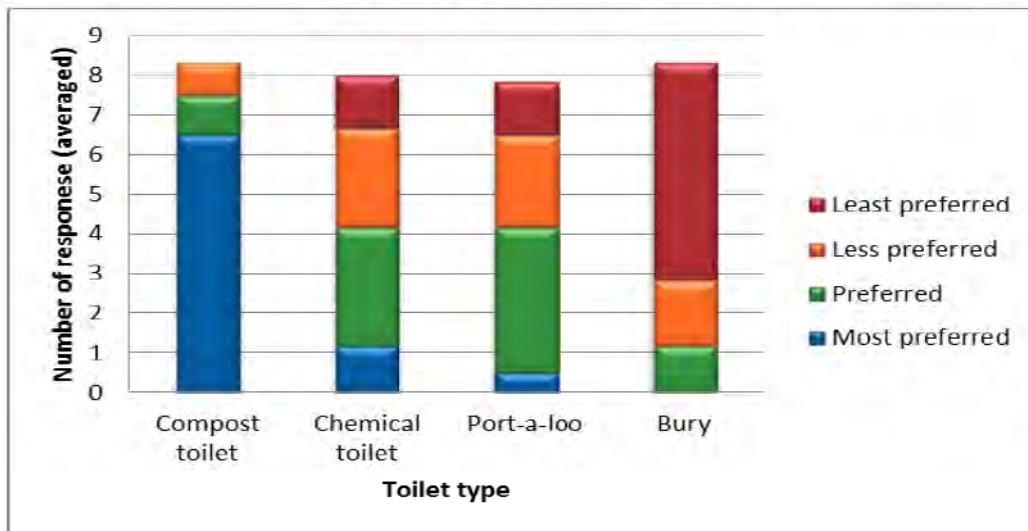




Chemical toilets are the second most preferred option in the short term, while port-a-loos are the second most preferred in the long term. Burying waste in plastic bags in their own garden was the least preferred option in the long term. In the short term, burying waste was more acceptable, in comparison to port-a-loos and chemicals toilets.

Averaging all responses for both long and short term preferences across all three surveys (Graph 4.17) shows that compost toilets were the most preferred emergency toilet option.

Graph 4.17: Overall emergency toilet preferences (short and long term combined)



Compost toilets were the most preferred emergency toilet option by trial participants.

4.9 Media coverage

4.9.1 Print media

WREMO took the opportunity during the trial to promote compost toilets as an option in an emergency. The request for participants published in the Dominion Post (Figure 3.8) was the first step. As a result of this article WREMO was approached by a Dominion Post reporter to do an article on the trial.

Two participants agreed to be interviewed an article on the trial was published in print (Figure 4.13) and an extended version published online on the Stuff (www.stuff.co.nz) website (Figure 4.14).

Figure 4.13: Article on the compost toilet trial (Domionion Post, Friday 16 November 2012).



Quake loo doesn't deserve the flush

Fr. Don Post 16/11/12

OLIVIA WANNAN

GIVING up modern plumbing for a compost toilet is not for the squeamish, but two Johnsonville residents have done it in the name of quake-preparedness.

Eric and Miranda Mawer are among 30 hardy Wellingtonians – including families and companies – trialling compost toilets to see if they could be an option following a major disaster.

The month-long quake-preparedness initiative led by the Wellington Region Emergency Management Office is now in its third week.

The compost toilet system features two separate chambers and buckets – one for liquid waste and the other for faecal matter.

Because the urine was sterile, it was diluted and poured on to the garden, while the solid material was composted in a wheelie bin with sawdust, sticks and soil.

While the trial had left the Mawers with a newfound appreciation of running water, they found the compost toilet “an awful lot easier than a Portaloos”.

Mrs Mawer had been pleasantly surprised by the system’s lack of smell and how easy it had been to clean.

“I thought that would be a minor ordeal but it hasn’t been,” she said.

Athfield Architects, based in Khandallah’s notable Athfield House, was one business to sign up.

While a few of his colleagues could not reconcile themselves to the compost system, architect Nick Mouat was a convert.

As the designated cleaner and composter of the toilet used by six of his colleagues, he had not found any problems with hygiene or smell, and was considering the system for use in his future designs.

Following the Christchurch quakes, 3000 Portaloos and 30,000 chemical toilets were distributed, though some homeowners made their own.

The idea for the trial came from compost toilet designer Matthew King’s time in Christchurch teaching residents about compost toilets.

The Canterbury region suffered problems treating the waste from chemical toilets as many treatment facilities were damaged – problems that could be compounded in Wellington if the capital was cut off from other areas following a quake.

“A compost toilet can take all your waste, possibly up to three months’ worth. People can be self-sufficient,” Mr King said.

In case of emergency: Eric Mawer and his wife Miranda have found the compost toilet, which has two chambers and buckets, easy to clean and not smelly.

Photo: DIEGO OPATOWSKI/FAIRFAX NZ

Figure 4.14: Online access from Stuff (accessed Friday 16 November 2012).

Taking quake readiness to the next level

OLIVIA WANNAN

Last updated 15:42 15/11/2012

3 56 6 1 Share



DIEGO OPATOWSKI/Fairfax NZ

While compost toilets have given Eric Mawer a newfound appreciation for running water, he highly recommends them above portaloos.

Giving up modern plumbing for a compost toilet is not for the squeamish, but two Johnsonville residents have done it in the name of quake-preparedness.

Eric and Miranda Mawer are part of a Wellington Region Emergency Management Office-led compost toilet trial to see if such a system could be an option following a major disaster.

Eleven local individuals, families and businesses were each given a compost toilet to use for a month, and were now in the third week.

The system featured two separate chambers and buckets, one for liquid waste and the other for faecal matter.

Because the liquid waste is sterile, it is diluted and poured onto the garden, while the solid material is composted in a wheelie bin with sawdust, sticks and soil.

While the trial had left the Mawers with a newfound appreciation of running water, they highly recommended the system as an option after an earthquake.

One of the biggest advantages was compost toilets could be set up in people's homes. Mr Mawer said.

"It's an awful lot easier than a portaloos."

Mrs Mawer had been pleasantly surprised by the system's lack of smell and how "piss easy" it had been to clean.

"I thought that would be a minor ordeal but it hasn't been," she said.

The couple became interested in quake-preparedness when they moved to Wellington from Britain two years ago.

Another reason for joining the trial was Mrs Mawer's hatred of waste.

"Anything that can be re-used, I'm in favour of," Mrs Mawer said.

The idea for the trial came from compost toilet designer Matthew King's time in Christchurch teaching residents about his systems.

Following the Christchurch quake, 3000 portaloos and 30,000 chemical toilets were distributed, though other people elected to make their own compost toilet or backyard long-drop.

The Canterbury region suffered problems treating the waste from chemical toilets as many treatment facilities were damaged - issues that could be compounded if Wellington is cut off from other areas following a quake.

Composting toilets, provided people would use them, could be another option besides chemical toilets and portaloos, Mr King said.

"A compost toilet can take all your waste, possibly up to three months' worth. People can be self-sufficient."

WREMO trial co-ordinator Sarah Gauden-Ing said the feedback from the trial had been positive, and in general for people it had just been "business as usual".

Some families were even reporting unexpected benefits, such as the system allowing two young children to use it at the same time.

A recent report from the Wellington Lifelines Group predicted people in Wellington city could be without water for up to 70 days following an earthquake.

Residents of Porirua would have to go up to 75 days, and those in the Hutt Valley up to 40 until running water services can be restored.

After the trial concluded, WREMO would prepare a report for civil defence teams and local authorities detailing how compost toilets could be stored and rolled out following an earthquake.

4.9.2 Social media

To continue raising the profile of the compost toilet trial we linked the online article on the WREMO's Facebook page (Figure 4.15).

Figure 4.15: WREMO Facebook posting (16 November 2012). This post was also shared by the Ministry of Civil Defence's NZ Get Thru facebook page.



4.9.3 Emergency sector

A short article on the trial was published in the MCDEM e-bulletin in November (Figure 4.16).

Figure 4.16: Article on the compost toilet trial (MCDEM's e-bulletin 12 November 2012).

Compost toilet trial

Portaloos, chemical toilets, long drop - or is a compost toilet a viable option during an emergency?

Given what we know about the impact of an earthquake in Wellington on our infrastructure, compost toilets may offer a longer term solution to managing human waste in a disaster.

With the help of the Director's Resilience Fund, Wellington Region Emergency Management Office (WREMO), GreenEarth Development, Waterscape and Wellington City Council are running a four week trial that will help us to understand more about what it means to have a compost toilet system in your house or workplace.

So far, the feedback we are getting from our participants is providing some very interesting data, not only on people's perceptions, but also the implications for civil defence emergency management

practitioners in promoting a system such as this, before and during an event. A final report on the trial and a guideline for the CDEM sector will be published by June 2013.



Help to understand what it means to have a compost toilet system.

Feedback from the media coverage was extremely positive. The participants received some light hearted ribbing from friends and work colleagues, but most people were extremely supportive and thought the toilets were a good idea.

As a result of the media coverage a number of contacts were received from other local government agencies and international association, including Global Dry Toilet Association of Finland, interested in the trial and its outcomes.

4.10 Assessment of information gathering tools

The trial used a variety of methods to collect data (site visits, surveys, diaries and debrief). The site visits were critical means of gathering information and ensuring participants well-being.

While some participants did not complete all of the information gathering tools, all participants did provide information through at least one method.

Using a range of different tools provided different ways for different people to provide information (Figure 4.17). Many of the tools had clear themes, and these were similar across the range of tools. Site visits were essential in ensuring the trial was conducted in a safe environment for participants.

The use of a variety of information gathering tools meant that all participants provided feedback on the trial even if they did not use one specific tool.

Figure 4.17 A modified diary title page, perhaps reflecting the participant's opinion of the information that was collected in the diary.



5 Conclusions

The trial of emergency compost toilets successfully demonstrated that they can be used safely by a wide variety of individuals and households. Using the materials provided and following the instructions participants were able to manage for four weeks without using their flush toilet.

In summary the results show that:

- People with an existing relationship with WREMO, even as simple as liking us on Facebook, are more likely to volunteer for a project of this nature.
- When recruiting, use a variety of methods to attract volunteers.
- Using traditional media, such as newspapers, to advertise for volunteers may not result in direct results, but may provide indirect benefits such as profiling a project.
- Wheelie bins were a good choice as a storage container, their wheels made them easy to manoeuvre when collecting material.
- Site access was variable; material was able to be delivered to and collected from sites with relative ease.
- Users will be anxious when first using an emergency compost toilet, however for most these fears will be overcome in the initial few days.
- Some users will need additional support and encouragement to use the emergency compost toilet.
- It will take a few weeks for new habits, such as remembering to place all paper in the faeces bucket, to form.
- In an emergency preventing access to 'normal' toilets may be needed.
- Children can use an emergency compost toilet successfully.
- Being allowed to decorate a toilet can be a way to engage children's enthusiasm, as well as clearly indicate the functions of the two separate buckets.
- Raising buckets, to reduce the gap between the bucket and the seat may be necessary for units that are used by young children.
- Flexibility of design allows users to adapt the compost toilet to their situation.
- Provisions may be needed to supply some users with additional material.
- The emergency compost toilet may work for business, though users may find this brings unwelcome intimacy to work relationships. Provision of additional units and allowing users some anonymity may aid implementation in a workplace.
- If used as per the instructions and emptied regularly there is little to no smell from the compost toilet. Separation of the urine and faeces prevents the development of a 'long-drop' smell.
- Ideally the storage receptacle should be located in the shade and additional mulch may be needed to 'cap' layers in the storage containers to reduce any potential odour.

- Users may need to trial different mulches before finding one that works for them.
- Creating a 'straw nest' makes emptying of the faeces bucket easier.
- Most participants emptied the urine bucket daily. The frequency that the faeces bucket was emptied varied depending on number of people and fastidiousness.
- Approximately half the users found that a compost toilet requires additional cleaning.
- Allow 2 litres of water per person per day, noting that some users may need additional amounts.
- Users will need to consider the need to access or store additional water to use the compost toilet in an emergency.
- Many users of a compost toilet may compost and use the waste material generated, even if initially against the idea. In an emergency clear guidance material on how to do this safely should be provided.
- Compost toilets were the most preferred emergency toilet option by trial participants.
- The use of a variety of information gathering tools meant that all participants provided feedback on the trial even if they did not use one specific tool.

The minimum required for a two person household to use a compost toilet in an emergency for six to eight weeks is:

- Compost toilet frame
- 2 large buckets
- 240 L storage container (or wheelie bin)
- 1 large bag wood shavings (or dry mulch)
- ½ large bag straw
- ½ large bag damp mulch (such as leaf litter or compost)
- 2 litres of water per person per day

6 Recommendations

The following recommendations are made as a result of the trial of emergency compost toilets:

1. That the use of compost toilets as an option in an emergency is promoted through the Wellington Region, by:
 - a. Providing information to the public on how to build and use an emergency compost toilet.
 - b. Identifying how compost toilets could be deployed in an emergency.
 - c. Assist in the promotion of compost toilets to the public as a viable option to use during an emergency.
2. That an emergency management sector guideline for the promotion and use of compost toilets in an emergency is developed and distributed nationwide.
3. That WREMO works with all councils in the Wellington Region to plan for sewerage disruption and emergency toilet options, including the use of compost toilets.

Appendix 1: Expressions of interest in the trial

Expressions of interest in the compost toilet trial

Introduction

Thank you for your interest in the compost toilet trial.

To participate you, your household or workplace must:

- **Be based in Wellington City.**
- **Provide a suitable location such as a bathroom or sheltered outdoor area for the toilets.**
- **Be available to meet with WREMO staff to discuss the trial and your involvement (by 25 September 2012).**
- **Attend a workshop/briefing on the use of compost toilets.**
- **Use the compost toilets exclusively during the 4 week trial (29 October - 23 November 2012), though you can use your normal bathroom facilities for all other matters.**
- **Use the compost toilets according to the instructions (some participants will have only a limited water supply available for cleaning purposes).**
- **Record your thoughts on participation in the trial (including a daily diary and online surveys).**
- **Be available for possible media interviews.**
- **Allow photos of your household being used in the promotion of the project.**
- **Allow weekly visits from the researcher and be available to answer questions on the trial.**

We require a variety of users (households and business of different sizes and types) so we cannot guarantee acceptance.

- I agree to the above requirements
- I've changed my mind and I am no longer interested

Background

Please provide the following information.

Name:

Contact phone number:

Contact email address:

Expressions of interest in the compost toilet trial

What suburb do you live/work in:

I am applying to participate as a

Household

Workplace

Applying as a household

Please select your living situation:

Single

Couple

Family

House share

Other (please specify)

Please select the type of building that best describes your home:

Lifestyle/Rural

Townhouse/Unit

House

Apartment

How many people will be participating?

How many occupants are in each of the following age ranges?

0 - 4	<input type="text"/>
5 - 15	<input type="text"/>
16 - 34	<input type="text"/>
35 - 64	<input type="text"/>
65 +	<input type="text"/>

Are any members of the household employed in the following workplaces?

Hospital or medical service

Childcare or school

Food preparation or service

Aged cared

Applying as a workplace

Expressions of interest in the compost toilet trial

Please note that the trial is intended for use by workplace employees and would not be suitable for a situation where members of the public would use facilities such as a cafe.

What is your organisation or business name?

What type of organisation / business is it?

How many staff, approximately, will take part in the trial?

Previous experience

Have you used a chemical toilet before?

No

Yes (please comment on your experience)

Have you used a compost toilet before?

No

Yes (please comment on your experience)

Have you used a port-a-loo before?

No

Yes (please comment on your experience)

Expressions of interest in the compost toilet trial

Have you used a 'long drop' before?

No

Yes (please comment on your experience)

Medical

It will be up to participants to maintain the cleanliness and hygiene of the compost toilets during the trial.

Are there any medical concerns, such as a persons with Immunosuppression, pregnancy or recent viral illness that may affect your ability to participate in the trial?

No

Yes (please provide a brief description)

Appendix 2: Compost toilets trial surveys

Pre-trial (27 – 28 October 2012)

Compost Toilets Survey 1 Pre-trial

Usage

*** 1. How easy do you think the compost toilets will be to use?**

Very comfortable	Comfortable	Neither comfortable nor uncomfortable	Uncomfortable	Very uncomfortable
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Benefits and Disadvantages

*** 2. Compared to a long drop, port-a-loo or chemical toilet what do you think the benefits of a compost toilet will be?**

*** 3. What do you think the disadvantages of a compost toilet will be?**

Use of compost toilets

*** 4. How comfortable would you feel about the short term (1 - 2 weeks) use of a compost toilet after a disaster**

Very comfortable	Comfortable	Neither comfortable nor uncomfortable	Uncomfortable	Very uncomfortable
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

*** 5. From the following options rank which would be your preferred options for short term use after a disaster?**

	Most Preferred	Preferred	Less Preferred	Least Preferred
Chemical toilet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Port-a-loo	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Compost toilet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Bury in the back yard in a plastic bag	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

*** 6. How comfortable would you feel about the longer term use (at least 3 months) of a compost toilet after a disaster**

Very comfortable	Comfortable	Neither comfortable nor uncomfortable	Uncomfortable	Very uncomfortable
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Compost Toilets Survey 1 Pre-trial

*** 7. From the following options rank which would be your preferred options for longer term use after a disaster?**

	Most Preferred	Preferred	Less Preferred	Least Preferred
Chemical toilet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Port-a-loo	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Compost toilet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Bury in the back yard in a plastic bag	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Cleaning

*** 8. How often do you clean your toilet?**

- Daily
- Every couple of days
- Weekly

Other (please specify)

Collection of waste

*** 9. For the purpose of the trial we will be collecting the solid waste. In an actual emergency which option do you think you would do?**

- Use as compost
- Store for waste collection

Comment

Any other comments

10. Your name (optional)

11. Any other comments/thoughts or feelings?

Mid-trial (10 – 11 November 2012)

Compost Toilets Survey 2 Mid Trial

Use

*** 1. How easy are the compost toilets to use?**

Very comfortable Comfortable Neither comfortable nor uncomfortable Uncomfortable Very uncomfortable

*** 2. What have been the positive experiences?**

*** 3. What have been the negative experiences?**

4. Any other comments

Briefing feedback

*** 5. Were the instructions at the briefing adequate?**

Did not attend briefing No
 Yes

6. What, if any, additional information should have been provided at the briefing?

Benefits and Disadvantages

*** 7. In an emergency and compared to a long drop, port-a-loo or chemical toilet what do you think the benefits of a compost toilet will be?**

8. What do you think the disadvantages of the compost toilet will be?

Cleaning

Compost Toilets Survey 2 Mid Trial

***9. How many people, on average, are using the compost toilet?**

***10. How often are you cleaning your compost toilet?**

- Daily
- Every couple of days
- Weekly

***11. Is this a change from your regular cleaning schedule?**

- Increase
- Same
- Decrease

***12. How much water, per day, are you using in the compost toilet and cleaning (excluding washing of hands)?**

- < 1 litre
- 1 - 2 litres
- 3 - 6 litres
- 7 - 11 litres
- > 12 litres

Use of compost toilets

***13. How comfortable would you feel about the short term (1 - 2 weeks) use of a compost toilet after a disaster?**

Very comfortable	Comfortable	Neither comfortable nor uncomfortable	Uncomfortable	Very uncomfortable
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

***14. From the following options rank which would be your preferred options for short term use after a disaster?**

	Most preferred	Preferred	Less preferred	Least preferred
Chemical toilet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Port-a-loo	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Compost toilet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bury in the back yard in a plastic bag	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Compost Toilets Survey 2 Mid Trial

*** 15. How comfortable would you feel about the longer term (at least 3 months) use of a compost toilet after a disaster**

Very comfortable	Comfortable	Neither comfortable nor uncomfortable	Uncomfortable	Very uncomfortable
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

*** 16. From the following options rank which would be your preferred options for longer term use after a disaster?**

	Most preferred	Preferred	Less preferred	Least preferred
Chemical toilet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Port-a-loo	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Compost toilet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Bury in the back yard in a plastic bag	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Further information

17. Do you have any further comments or issues to note?

Post trial survey (24 – 26 November 2012)

Compost Toilet Survey 3 Post Trial

Use

*** 1. How easy were the compost toilets to use?**

Very comfortable Comfortable Neither comfortable nor uncomfortable Uncomfortable Very uncomfortable

*** 2. What were the positive experiences?**

*** 3. What were the the negative experiences?**

4. Any other comments

Briefing feedback

*** 5. Were the instructions at the briefing adequate?**

Did not attend briefing

Yes

No

6. What, if any, information should have been provided at the briefing?

Benefits and Disadvantages

*** 7. In an emergency and compared to a long drop, port-a-loo or chemical toilet what do you think the benefits of a compost toilet will be?**

*** 8. What do you think the disadvantages of the compost toilet will be?**

Compost Toilet Survey 3 Post Trial

Cleaning

*** 9. How many people, on average, are using the compost toilet?**

10. How often did you clean the compost toilet?

- Daily
- Every couple of days
- Weekly

Other (please specify)

11. Was this a change from your regular cleaning schedule?

- Increase
- About the same
- Decrease

*** 12. Approximately how much water, per week, is the compost toilet requiring for use and cleaning (excluding washing of hands)?**

- < 1 litre
- 1 - 2 litres
- 3 - 6 litres
- 7 - 11 litres
- > 12 litres

Collection of waste

Compost Toilet Survey 3 Post Trial

*** 13. For the purpose of the trial we collected the solid waste. In an actual emergency which option do you think you would do?**

- Use as compost
- Store for waste collection

Any additional comments?

Use of compost toilets

*** 14. How comfortable would you feel about the short term (1 - 2 weeks) use of a compost toilet after a disaster?**

Very comfortable	Comfortable	Neither comfortable nor uncomfortable	Uncomfortable	Very uncomfortable
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

*** 15. From the following options rank which would be your preferred options for short term use after a disaster?**

	Most preferred	Preferred	Less preferred	Least preferred
Chemical toilet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Port-a-loo	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Compost toilet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Bury in the back yard in a plastic bag	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

*** 16. How comfortable would you feel about the longer term (at least 3 months) use of a compost toilet after a disaster?**

Very comfortable	Comfortable	Neither comfortable nor uncomfortable	Uncomfortable	Very uncomfortable
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

*** 17. From the following options rank which would be your preferred options for longer term use after a disaster?**

	Most preferred	Preferred	Less preferred	Least preferred
Chemical toilet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Port-a-loo	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Compost toilet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Bury in the back yard in a plastic bag	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Further information

Compost Toilet Survey 3 Post Trial

***18. Did WREMO provide you with sufficient support and information during the trial?**

Yes

No

19. Was there anything we could have done differently?

20. Do you have any further comments or issues to note?

Appendix 3: Participant diary

Compost toilet trial

Participant diary

29 October – 23 November 2012



Participant identification

Name	
Address	

WREMO Contacts

Sarah Gauden-Ing 021 494 281
sarah.gauden-ing@gw.govt.nz

Craig Hamilton 027 297 0811
craig.hamilton@gw.govt.nz

Guide to completing this diary

This diary is designed to record the use of the compost toilet. The information from this diary will be used to develop a WREMO guideline for building and using a compost toilet in an emergency. **It is not designed to monitor your toileting or cleaning habits.**

Each page includes a number of set questions and a comment field. Information we are seeking includes:

- All users' feelings and perceptions on the use of the compost toilets.
- Any trends noted by household or workplace members, such as delaying toileting until at work/school/home so as to avoid the use of the compost toilet.
- Any changes you have made to integrate the compost toilet system into your home or workplace.
- Any hygiene changes (e.g. washing hands more or for a longer time).
- Whether additional persons (such as visitors) have used the facility, and their repose.
- Any hints or tips that you have regarding the use of the toilet and composting system.

Thank you for your on-going support of this trial.

Monday 29 October 2012

How often has the feces bucket been used?	
Has the feces bucket been emptied?	Yes/No
Has the urine bucket been emptied?	Yes/No
Are there any smells?	Yes/No
Does it feel hygienic?	Yes/No
Has it been cleaned?	Yes/No
If it has been cleaned, how? How much water was used?	
Any other comments or feelings to note?	

Appendix 4: Information gathered on site visits

Table A4.1: Information gathered using the ipad application iAuditor from site visits.

	Question	Response
Follow-up	Anything to be followed up from previous visits?	
Participants	Overall experience? ¹¹	<i>Positive/Neutral/Negative</i>
	What is working well?	
	What is not working well or has been difficult?	
	Have other people used the toilet?	<i>Yes/No</i>
	If yes, how did they found it?	
	Have you noticed any change in habits? Such as washing hands more frequently, cleaning the toilet more often?	<i>Yes/No</i>
	Details	
	Have any concerns been raised (for example by neighbours)?	<i>Yes/No</i>
	How much water (litres) do you estimate you use daily in the toilets? <i>Excludes washing of hands</i>	
	How is the diary going?	
Any other comments?		
Toilet units	Cleanliness	<i>Clean/Unclean</i>
	Any smells	<i>None/Slight/Strong</i>
	Photo of unit (if needed)	
	Comments	
Wheelie bins	Cleanliness	<i>Clean/Unclean</i>
	Any smells	<i>None/Slight/Strong</i>
	Liquid in bin	<i>None/Some/Lots</i>
	Photo of unit (if needed)	
	Comments	
Additional supplies	Supplies need?	<i>None/Straw/Wood Shavings/Other</i>
	If other, provide details	
Overall	Any final comments?	

¹¹ This value was either provided by the participant or assigned by the WREMO researcher as an assessment of the participants overall comments

Appendix 5: Guide to using the emergency compost toilet

How to Use the Emergency Compost Toilet System

This summary has been developed for the purposes of the Wellington Region Emergency Management Office (WREMO) trial only.

The compost toilet system consists of two components:

1. Two-chamber toilet box
2. Wheelie bin

If at any point during the trail you experience gastrointestinal illness, please stop using the compost toilet, seek medical attention and inform WREMO as soon as possible.

The two-chamber toilet box

The toilet box incorporates two 15 litre buckets. One bucket for urine and the other is for faeces. Separation of the urine from the faeces is essential in this system.

The chamber box is made of plywood with a hinged lid for easy access to the buckets inside. We recommend that the toilet is set up inside the house for ease of use and convenience.

The box is sturdy. Its dimensions are 1200 mm wide, 600 mm deep and 400 mm deep (approximately the same height as a conventional toilet). The unit can be split into two separate units if needed.



Photo 1: The two-chamber toilet box

Urine bucket

Before use, place 1 litre of water in the urine bucket. Place any toilet paper used in the faeces bucket. When the urine bucket is 1/3 to 1/2 full remove the bucket and fill with water to dilute. Urine is sterile and this liquid can be used as a nitrogen fertiliser in your garden or other green areas.

Empty the urine bucket daily, as this prevents odours.

Health Tip

After emptying the urine bucket, wash your hands thoroughly with running water and soap.

Faeces bucket

Place a handful of straw (or other 'airy' mulch¹) in the bottom of the bucket and around the sides of the bucket.

After going to the toilet, a handful of sawdust is sprinkled over to cover. Toilet paper also goes into this bucket as it is broken down in the composting process. A small amount of urine in the bucket is not a problem. Try to avoid a sloppy wet situation as this causes odours and the promotion of unwanted anaerobic bacteria.



Photo 2: The faeces unit

Health Tip

After using the toilet, wash your hands thoroughly with running water, soap and a nail brush (if dry organic matter or faeces goes beneath your nails).

¹ This compost system relies on air circulating through the compost mixture; therefore a compost material that allows airflow, such as loose straw, provides a good lining.

Once the faeces bucket is 2/3 full, the bucket can be emptied, rinsed out and a fresh layer of straw placed in the bottom and around sides. It is now ready to be used again. At no point is it necessary to handle the material.

Health Tips

1. Limit the number of people and amount of contact they have with the faeces and the bucket. If possible, allocate one person to be responsible for managing the emptying and cleaning of the faeces bucket.
2. Use gloves to empty the buckets of faeces.
3. When washing the bucket, use a bleach solution or another sanitising solutions and water. Try and avoid the splashes onto your clothes, face, hands and other parts of your body.
4. Once the washing of the bucket is completed, rinse the bucket thoroughly. Dispose of the gloves (if a pair was used) and wash your hands thoroughly with running water, soap and a nail brush (if needed).
5. If any other part of your body comes into contact with the liquid whilst washing the bucket, wash those with running water and soap as well.
6. If your clothes are contaminated, ensure you take them off and place them where they can be cleaned. Ensure you wash your hands with running water and soap after taking off the contaminated clothes.

The wheelie bin

The wheelie bin is provided as a readily available covered container for storing the composting faeces. Ensure the wheelie bin is located in a place on your property that is away from the boundary fence.

The wheelie bin will be set up to represent a conventional compost pile. A layer of sticks is placed criss-crossed in the bottom to 15 cm to create an air gap. This is covered with a layer of straw or dried grass and a thin layer of soil from the garden as a microbial activator. A bundle of sticks is also placed up one corner to provide air circulation.



As each bucket from the toilet box is tipped into the wheelie bin an additional layer of sawdust to cover any exposed faeces and absorb any excess urine. The sawdust will also deter flies and prevent odours.



It is important that the lid of the wheelie bin is kept closed when not in use. Place something heavy onto the top of the lid to ensure it stays down in case of bad weather.

When the bin is 3/4 full place a 3 cm layer of soil over the top of the mixture to seal.

Photo 3: Emptying the faeces bucket into the wheelie bin

For the purposes of the trial, the bin is collected after 4 weeks to be composted at a central facility. If the wheelie bin fills up prior to the 4 week collection period, please contact WREMO to arrange for collection of the bin and a replacement bin sent to you.

Health Tip

After emptying the toilet bucket, wash your hands thoroughly with running water, soap and a nail brush (if dry organic matter or faeces goes beneath your nails).

What to do if there is limited or no water available?

For the purpose of the trial use your normal bathroom facilities for cleaning hands. However if there is any disruption to your water supply the compost toilets can continue to be used:

- If water is limited, then wash your hands with the available running water, soap and a nail brush (if needed), then use alcohol sanitisers.
- If no running water is available, then use wet wipes and alcohol sanitisers.



Compost toilet hints

Dos	Don'ts
Start by adding straw to the faeces bucket before use	Place anything else into toilets (rubbish, sanitary pads, tampons etc.)
Add sawdust to the faeces bucket after every use	Add chemicals to toilet system (e.g. to prevent odours)
Place toilet paper in the faeces bucket (not the urine bucket)	Add anything to urine toilet except water
Pee into the faeces bucket if you need to	
Keep the lids closed (both of toilet and wheelie bin)	
Empty the urine bucket each day - dilute 5:1 with water and pour around trees and gardens	
Place a layer of sawdust over the material once it has been added to the wheelie bin	
Contact WREMO if you have any questions or concerns.	

WREMO Contacts

Sarah Gauden-Ing 021 494 281

sarah.gauden-ing@qw.govt.nz

Craig Hamilton 027 297 0811

craig.hamilton@qw.govt.nz



Appendix 6: Material delivered to participants

Toilet unit

Figure A6.1 Assembled compost toilet unit.



Figure A6.2 Assembled compost toilet unit with lid open showing buckets set up ready for use.



Storage container

For the trial, wheelie bins were used as the storage containers. These wheelie bins were set up to allow air to circulate, thus improving the composting ability of the material added. This setup involved placing cross hatched twigs at the base of the wheelie bin (Figure A6.3) and then place long branches diagonally from top to bottom.



Figure A6.3: Interior of wheelie bin showing the cross hatched twigs at base

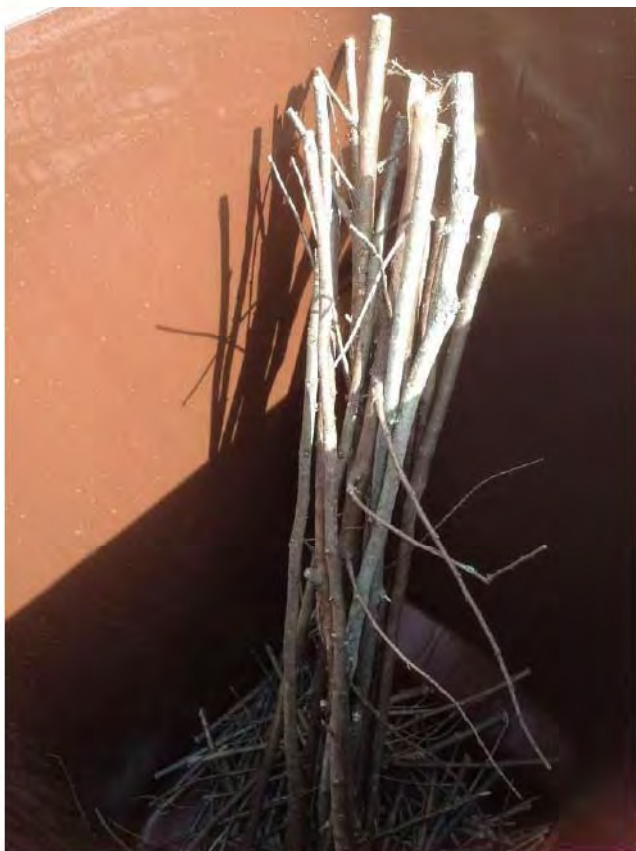


Figure A6.4: Interior of wheelie bin showing the branches extending diagonally from top to bottom.

Wood shavings and straw



Figure A6.5: Photos of the wood shavings (Kahikatea was used for the trial), a large bag (approximately 30 litres capacity), straw and a small bag (approximately 10 litre capacity).

Participants were also provided with a small bucket to store and distribute the wood shaving in and a cup. The cup provided a guide for the correct amount of wood shavings to use.

Participant diary

See **Appendix 2** for copies of the participants diary

Leaf mulch

This material was supplied to participants during the course of the trial for use either in the toilets or as a 'capping' layer in the wheelie bin



Figure A6.6: Photos of the leaf mulch which was delivered in small bags of approximately 10 litre capacity.

How to use notices

Emergency Compost Toilet Trial

We are participating in a four week trial of a compost toilet, which could be used in an emergency. These toilets are straight forward to use, the most important thing is to use the separate units for urine and faeces.

Urine

- Before use add a litre of water to the bucket
- Use the toilet as normal but **place all toilet paper in the faeces unit**
- Empty the urine bucket daily, fill bucket with water and empty into garden

Faeces

- Place a handful of straw or mulch in the bottom and around sides of bucket
- Use the toilet as per normal
- Place 1 cup of sawdust over top
- All toilet paper is added to this unit. Other material (such as sanitary napkins) should not be disposed over this toilet.
- A small amount of liquid in this bucket is not a problem, but avoid a sloppy wet situation
- Once the bucket is 2/3 full it can be emptied.
- Wash hands thoroughly under running water

Diary

- Please update the diary daily

Any questions or concerns contact us

Sarah Gauden-Ing 021 494 281
sarah.gauden-ino@aw.govt.nz
Craig Hamilton 027 297 0811
craig.hamilton@aw.govt.nz

Thank you for your ongoing support of this trial



Emergency Compost Toilet Trial

- Use the separate toilets for pees and poos.
- After peeing put all toilet paper in the poo bucket.
- After pooing add a cup of sawdust over top.
- If needing to pee and poo use the poo bucket.
- **All toilet paper in the poo bucket.**
- Wash hands thoroughly with running water and soap after use
- Any questions or concerns contact Sarah (021 494 281)



Emergency Compost Toilet Trial – Wheelie Bin

- Locate wheelie in a shelter spot, away from any boundary fences
- Keep the lid closed (place something heavy on top).
- Ensure air can circulate
- After emptying the faeces bucket add a layer of sawdust to absorb liquid, deter flies and prevent odours
- Wash hands thoroughly with running water, soap and a nail brush (if any matter gets beneath your nails).
- Any questions or concerns, or if the bin is getting full contact WREMO



Appendix 7: Summary of information collected from site visits

Week One (29 October – 4 November 2012)

All eleven sites were visited during the week.

- Odour was the major concern identified by participants.
 - one household reported odour spreading through the upper floors of the house. This was due to the house layout and the way the house is built and the bathroom ventilated (which was directly under the floor of the upper stories). The household had taken steps to reduce the issue (reducing air flow and adding peat to the toilet), and these steps were confirmed with our experts)
 - several households had introduced some form of scent into the toilet. Either adding a scent dispersant or adding some scented oil to the wood shavings. Another participant suggested that adding some scented oils to the compost would be nice.
 - One household found the odour from the wheelie bin when opened very strong. The wheelie bin was located in an enclosed back porch and thus closer to the house than most of the wheelie bins. The participant was supplied with a small bag of mulch to provide a denser layer.
- Many of the adults admitted feelings of apprehension prior to using the trial. Some admitted to delaying or deferring toileting, but had since used the toilets without any problems. As one participant said 'when you have got to go, you have got to go'.
- Most participants do not report a change in their cleaning/hygiene routine. One reported that they were 'paranoid' on their first day, but have relaxed back to their pre-trial standard.
- One participant reported a greatly increased time taken to empty and clean buckets and the units, this user was emptying and cleaning the poo bucket after every use, as they did not like the thought of the material sitting in the house.
- Those participants who assembled their own units found them easy to assemble, taking less than 5 minutes.
- Dogs appear to be very interested in the units and the buckets, and one participant reports additional steps are need to keep the faeces bucket out of the dog's reach when it is being emptied and cleaned.
- Several participants are, voluntarily using minimal water to fill, dilute and clean the bucket, and are using approximately two litres per couple per day. The two households with children have reported higher levels of water use (5 – 7 litres per household per day). The anxious user was using 10 – 15 litres.
- Most participants have found the 'straw nest' works well and there is little material left in the bucket once emptied.
- The household with older children (7, 8, 10, and 11) reported favourable on the initial week. The 10 year old in particular reported the toilets as 'cool'
- The household with younger children (3, 5, 7, and 9) reported favourable on the initial week. The younger children were allowed to draw images identifying which unit was to be used for which function (see Figure 4.6). This had proven to be such a success that the youngest child had snuck in to use the toilet prior to trial beginning
- Both households reported that an unexpected benefit was that two children could use the unit at the same time.

Week Two (5 – 9 November 2012)

Given the comments regarding odour Matt King of Green Earth Developments accompanied the WREMO researcher to six sites, the remaining five sites were visited by the WREMO researcher.

- For most households the compost toilet had settled into being the norm.
- One was still struggling with the change, the smell and the presence of the compost toilet in her household. They were emptying the poo bucket after every use and were using more water than other households (10 – 15 litres per day). This participant required some additional material (wood shavings and straw).
- At one workplace two people admitted to the WREMO researcher that they were not in fact using the compost toilet. This appeared to appear to relate to workplace dynamics, while both had initially been keen on the idea when faced with the reality and some teasing from other members of the workplace, neither had used the toilet. One issue at the workplace was in fact the small number users and the implied intimacy with work colleagues.
- Many of the children had gotten over their initial enthusiasm; some were refusing to use the compost toilet, stating they would prefer a hole in the ground. Other children continued preferred it (10 year old).
- One family reported that the youngest (a female aged 3) was able to on occasion to aim for the gap (2 - 3 cm) between the top of the bucket and the lid of the unit, creating additional mess.
- There was very little odour from either the toilets or the wheelie bins. When initially opened a distinct smell may 'waft' out, particularly from wheelie bins, but this quickly dissipates leaving little to no smell.
- Several participants commented that the strongest smell was the wood shavings or straw.
- Many participants commented that there was additional cleaning required, in particular due to the wood shavings. The amount of additional cleaning was ranked between just a little and a considerable commitment (~1/2 hour per day). One participant reported a reduction in the amount of cleaning.
- Many participants commented that the habit of putting the toilet paper in the poo bucket, rather than dropping it into the urine bucket was a hard habit to break. Additional reminders (Figure 4.3) were required.
- Comment that sometimes one cup of shavings is not enough to cover material in the bucket.
- Most participants were provided with a bag of leaf mulch (Figure A6.5). This material was denser than the wood shavings that had been initially provided. This leaf mulch could be used either in the toilet units (instead of the wood shavings) or in the wheelie bin (as a 'capping' layer).
- Several participants commented that it was important to identify the normal flush toilet, or WC room, as not being available for use. A reminder was needed for guests, moments of inattention, or in the middle of the night when it was easy to forget. (Figures 4.4 and 4.3).

Week Three (12 – 16 November 2012)

Two of the site visits were combined with media interviews by a Dominion Post journalist and photographer (see section 4.9). All other sites were visited by the WREMO researcher, some accompanied by the project leader.

- At two sites the participants were not home, due to other commitments. Both participants commented (text message or email) that all was well. This perhaps reflects how at ease participants were with the trial. If things were not going well the visit from the WREMO staff member would have been seen as more important by the participants.
- Some participants reported preferring the leaf mulch to the wood shavings. Others found the mulch smell off-putting and preferred the straw and wood shavings in the toilet. Many participants used the leaf mulch to add a denser, capping layer to the wheelie bin.
- The anxious participant was feeling more relaxed about the system; they had used more material than other and hence had filled their 120 L wheelie bin. This bin was replaced with an empty one for the last week.
- Privacy was a factor at a number of sites; one workplace said they came in on the weekends and emptying the faeces bucket when there were no additional persons around.
- One participant commented that you miss the sound of a flush as a cue that their partner had finished in the bathroom.
- At the family where the small child had been creating additional mess we raised the buckets up using wooden planks (photo). This was very successful, and despite her best efforts no further spills were reported.
- At the family where the children had stated they would prefer a long drop they had been offered the opportunity to dig and use one. They had declined preferring to use the established compost toilet.
- Some of the units are getting marked (for example a coffee cup that was inadvertently placed on the plyboard marking it). This is off-putting as the units look dirty even though they are clean.
- One pee bucket had become quite stained and marked; none of the others have the same problem.
- One participant had contracted food poisoning (the source was identified as being outside the trial) and had returned to using the normal flush toilet for a couple of days so as to (successfully) avoid infecting other household members.
- The small business owner commented that the two essentials their business needed after an emergency was power and internet. With bottled water and a compost toilet they could return to business before water and sewage systems were restored.

Week Four (19 – 23 November 2012)

All sites were visited and final comments from the on-site visits were collected.

- Many were surprised that trial had passed so quickly and that they had adapted so quickly.
- Some children (particularly those in the 7 – 10 year old age bracket) were looking forward to the return to the normal toilet, others preferred the compost toilet
- If the toilet seat is not properly aligned then bottoms can rest against the plywood and cut circle, which was described 'as scratchy'.
- Some flies were reported; this may reflected the warmer weather that occurred this week.
- The participant who had initially been most anxious commented that if they could adapt, then anyone could. They would like to add a compost toilet to their emergency kit.

Table A7.1: Summary of the information gathered from the site visits.

Participant	Week	Overall experience	Used by others?	Any change in habits?	Any concerns raised?	Daily water use (litres)	Toilets		Wheelie Bin		
							Cleanliness	Smelliness	Cleanliness	Smelliness	Any liquid?
A	Week 1	Neutral	No	No	No	-	Clean	Strong	Clean	Slight	None
	Week 2	Positive	No	No	No	4	Clean	Slight	Clean	Slight	None
	Week 3	-	-	-	-	-	Clean	Slight	Clean	Slight	None
	Week 4	Positive	No	No	No	2	Clean	Slight	Clean	None	None
B	Week 1	Positive	Yes	No	No	6	Clean	None	Clean	Slight	None
	Week 2	Neutral	Yes	No	No	7	Clean	None	Clean	None	None
	Week 3	Positive	Yes	No	No	7	Clean	None	Clean	Slight	Some
	Week 4	Positive	Yes	No	No	5	Clean	None	Clean	Slight	Some
C	Week 1	Neutral	No	Yes	No	6	Clean	Slight	Clean	None	None
	Week 2	Neutral	Yes	No	No	6	Clean	Slight	Clean	Slight	None
	Week 3	Negative	Yes	Yes	No	12	Clean	None	Clean	Slight	None
	Week 4	Positive	Yes	-	No	15	Clean	None	Clean	Slight	None
D	Week 1	Neutral	Yes	-	No	-	Clean	Slight	Clean	None	None
	Week 2	Negative	Yes	-	No	-	Clean	Slight	Clean	Slight	None
	Week 3	Positive	Yes	Yes	No	-	Clean	None	Clean	None	None
	Week 4	Neutral	Yes	No	No	-	Clean	None	Clean	Slight	None
E	Week 1	Neutral	No	No	No	2	Clean	Strong	Clean	None	None
	Week 2	Positive	No	No	No	-	Clean	Slight	Clean	None	None
	Week 3	Positive	No	No	No	-	Clean	None	Clean	None	None
	Week 4	Positive	No	No	No	-	Clean	None	Clean	None	None
F	Week 1	Neutral	No	No	No	0.5	Clean	None	-	-	-
	Week 2	Positive	No	No	No	0.5	Clean	None	Clean	None	-
	Week 3	Positive	No	No	No	0.5	Clean	Slight	Clean	None	None
	Week 4	Positive	No	No	No	0.5	Clean	None	Clean	None	None

Participant	Week	Overall experience	Used by others?	Any change in habits?	Any concerns raised?	Daily water use (litres)	Toilets		Wheelie Bin	
							Cleanliness	Smelliness	Cleanliness	Smelliness
G	Week 1	Positive	Yes	Yes	No	1	Clean	Slight	-	-
	Week 2	Positive	Yes	Yes	no	3	Clean	Slight	Clean	Slight
	Week 3	Positive	Yes	Yes	No	2	Clean	Slight	Clean	Slight
	Week 4	Positive	Yes	No	No	2	Clean	Slight	Clean	Slight
H	Week 1	Neutral	No	No	No	1	Clean	Slight	Clean	None
	Week 2	Positive	No	Yes	No	1	Clean	Slight	Clean	None
	Week 3	Positive	Yes	No	No	1	Clean	None	Clean	None
	Week 4	Positive	No	No	No	1	Clean	Slight	Clean	None
I	Week 1	Neutral	No	Yes	No	1	Clean	None	Clean	Slight
	Week 2	Positive	No	No	No	1	Clean	None	Clean	Slight
	Week 3	Positive	Yes	No	No	1	Clean	None	Clean	Slight
	Week 4	Neutral	Yes	No	No	1	Clean	None	Clean	None
J	Week 1	Neutral	No	No	No	1	Clean	None	Clean	None
	Week 2	Positive	No	No	No	1	Clean	Slight	Clean	Slight
	Week 3	-	-	-	-	-	-	-	-	-
	Week 4	Positive	Yes	No	No	2	Clean	Slight	Clean	Slight
K	Week 1	Negative	No	Yes	No	4	Clean	None	Clean	Slight
	Week 2	Neutral	No	Yes	No	15	Clean	None	Clean	Slight
	Week 3	Neutral	No	Yes	No	10	Clean	None	Clean	None
	Week 4	Positive	No	No	No	13	Clean	None	Clean	None

Appendix 8: Notes from the debrief

Design

- Adjustment required to the height of the toilet so more suitable for the elderly/disabled.
- The toilet feels like a toilet, it's comfortable, stable, normal and usable.
- Needs a few design enhancements to improve the system. Especially on the height, lid, guides and finish. Could even look at the ease of opening the top off (hinges of some sort).

Cleaning and Smell

- Relatively easy to clean the buckets, but certainly an increase in the amount of cleaning required.
- The unit did mark – this could give a perception of being unclean (when clean). Options to reduce this include plastic layer on top or different finish (wax or oil).
- Smell was not an issue - amazingly un-pongy (both toilet and wheelie bin). Chemical toilets still smell.
- Keeping the wheelie bin dry helps with the odour.
- Keep the wheelie bin in the shade to reduce the smell, but then this could slow down the composting element as not dry with air circulation. In an emergency situation smell reduction will probably be important.

Promotion

- Make the distinction between a compost toilet (inside your own house) and a shared port-a-loo when marketing it to the public. Self-sufficiency is important.
- Environmentally friendly toilets - wins 'lids down' as an alternative option.
- Flat pack it. Sell as complete package or individual components like a getaway kit. Need to include clear instructions for use, the stickers, cup, saw dust etc.
- Should sell as multi-purpose i.e. use at the bach, eco-coffin or outdoor storage unit. Could use the box to store emergency food in normal use. Multi-purpose.
- Key message for selling - you don't have to go down the road in the middle of the night in the cold; you can have a system in your home.
- Use YouTube to promote. Video of famous people putting unit together.
- If promoting, also think about waste management – worm farms etc.
- Place pattern on the internet, so people can manufacturer their own.

Planning

- Reduced logistical support from council (compared to port-a-loos, but put a burden on the people).
- Think about advice on how to treat (worm farm, compost, pile in garden) and then use (many people would not be comfortable with use of human waste in vegetable garden/food chain).
- Street compost point - individuals use to deposit their waste. Draw back as it raises a lot of other barriers to participate (perceptions).
- Access to properties given Wellington's topography will need to be factored into the planning.
- Apartments - different set of planning required dealing with them. Buckets would probably need lids and central collection point.

Tips

- Perception (re wheelie bin location), don't want in visual view or it located in vicinity of where you socialise/relax.
- When people put in too much material to cover the faeces, it bulks the up the content of the wheelie bin.
- Providing a cup for the saw-dust indicated the amount to use e.g. 1 cup.
- Need a procedure (instructions) to follow, but could provide a number of options for tailor to their needs. Like a basic cake recipe then can adjust (e.g. to make chocolate cake or coffee cake derived from same base recipe).
- Initial worry about use and smell – had to 'get over it' and use. After that was fine, and became normal.
- If did get a little smelly it was a reminder that needed to be emptied.
- Children liked the novelty, after a month some still preferred the compost toilet to the normal toilet, others were glad to be back to the flush toilets.
- Visitors coped with toilets; children needed clear guidance on how to use.
- Could use the circles (from the seat cut outs) as bucket rises.
- Advice on different mulches would be good.

Feedback

- Information provided was good.
- 'Helpline' to WREMO staff was useful.
- People going in 'cold' could use the toilets and the wheelie bin.

Appendix 9: Diary results

Table A9.1: Summary of diary entries by Participant A

Dates	Use of faeces bucket	Faeces bucket emptied?	Urine bucket emptied?	Any smell?	Feels hygienic?	Cleaned?	Water use (L/day)
29/10/2012	-	-	-	-	-	-	-
30/10/2012	1	Yes	No	No	Yes	No	-
31/10/2012	0	No	No	No	Yes	No	-
1/11/2012	1	Yes	Yes	No	Yes	Yes	-
2/11/2012	0	No	No	No	Yes	No	-
3/11/2012	0	No	No	No	Yes	No	-
4/11/2012	1	Yes	No	No	Yes	Yes	-
5/11/2012	1	Yes	Yes	No	Yes	Yes	-
6/11/2012	1	Yes	No	No	Yes	No	-
7/11/2012	-	-	-	-	-	-	-
8/11/2012	-	-	-	-	-	-	-
9/11/2012	-	-	-	-	-	-	-
10/11/2012	-	-	-	-	-	-	-
11/11/2012	-	-	-	-	-	-	-
12/11/2012	-	-	-	-	-	-	-
13/11/2012	-	-	-	-	-	-	-
14/11/2012	-	-	-	-	-	-	-
15/11/2012	-	-	-	-	-	-	-
16/11/2012	-	-	-	-	-	-	-
17/11/2012	-	-	-	-	-	-	-
18/11/2012	-	-	-	-	-	-	-
19/11/2012	-	-	-	-	-	-	-
20/11/2012	-	-	-	-	-	-	-
21/11/2012	-	-	-	-	-	-	-
22/11/2012	-	-	-	-	-	-	-
23/11/2012	-	-	-	-	-	-	-

Table A9.2: Summary of diary entries by Participant B

Dates	Use of faeces bucket	Faeces bucket emptied?	Urine bucket emptied?	Any smell?	Feels hygienic?	Cleaned?	Water use (L/day)
29/10/2012	6	No	Yes	No	Yes	No	-
30/10/2012	5	Yes	Yes	No	Yes	Yes	-
31/10/2012	5	Yes	Yes	No	Yes	Yes	-
1/11/2012	6	Yes	Yes	Yes	Yes	Yes	1
2/11/2012	6	Yes	Yes	No	Yes	Yes	1
3/11/2012	7	No	Yes	No	Yes	No	1 - 2
4/11/2012	-	No	Yes	-	-	-	3
5/11/2012	5	Yes	Yes	No	Yes	Yes	-
6/11/2012	5	Yes	Yes	No	Yes	Yes	-
7/11/2012	5	Yes	Yes	No	Yes	Yes	-
8/11/2012	5	Yes	Yes	No	Yes	Yes	-
9/11/2012	5	Yes	Yes	No	Yes	Yes	-
10/11/2012	5	Yes	Yes	No	Yes	Yes	-
11/11/2012	5	Yes	Yes	No	Yes	Yes	-
12/11/2012	-	No	No	No	Yes	Yes	-
13/11/2012	-	No	No	No	Yes	Yes	-
14/11/2012	-	No	No	?	Yes	Yes	-
15/11/2012	-	Yes	Yes	No	Yes	Yes	-
16/11/2012	2	No	No	No	Yes	yes	-
17/11/2012	4	Yes	Yes	No	Yes	Yes	4 - 5
18/11/2012	3	Yes	Yes	No	Yes	Yes	-
19/11/2012	5	Yes	Yes	No	Yes	Yes	-
20/11/2012	5	Yes	Yes	No	Yes	Yes	-
21/11/2012	5	Yes	Yes	No	Yes	Yes	-
22/11/2012	5	Yes	Yes	No	Yes	Yes	-
23/11/2012		Yes	Yes	Yes		No	-

Table A9.3: Summary of diary entries by Participant C

Dates	Use of faeces bucket	Faeces bucket emptied?	Urine bucket emptied?	Any smell?	Feels hygienic?	Cleaned?	Water use (L/day)
29/10/2012	5	Yes	Yes	Yes	-	Yes	6
30/10/2012	5	No	No	Yes	Yes	No	-
31/10/2012	2	Yes	Yes	Yes	-	Yes	-
1/11/2012	2	-	No	Yes	Yes	-	-
2/11/2012	3	No	No	Yes	-	-	-
3/11/2012							-
4/11/2012	2	Yes	Yes	Yes	No	Yes	2
5/11/2012	4	Yes	Yes	Yes	No	Yes	-
6/11/2012	5	No	No	Yes	No	No	-
7/11/2012	5	Yes	Yes	Yes	No	Yes	-
8/11/2012	4	Yes	No	Yes	No	Yes	1 - 2
9/11/2012	4	Yes	Yes	Yes	No	No	-
10/11/2012	5	-	-	Yes	-	Yes	-
11/11/2012	5	Yes	Yes	No	Yes	Yes	-
12/11/2012	5	No	No	-	-	No	-
13/11/2012	2	Yes	Yes	Yes	No	-	-
14/11/2012	3	No	No	No	Yes	No	-
15/11/2012	3	Yes	Yes	Yes	No	Yes	-
16/11/2012	5			Yes			-
17/11/2012	4	Yes	Yes	Yes	No	Yes	-
18/11/2012	1	Yes	Yes	Yes	No	No	-
19/11/2012	7			Yes	-		-
20/11/2012	4	Yes	Yes	Yes	No	No	-
21/11/2012	3	-	Yes	Yes	-	-	-
22/11/2012	3	-	-	-	-	-	-
23/11/2012	2	-	-	Yes	-	-	-

Participant D did not complete their diary.

Table A9.4: Summary of diary entries by Participant E

Dates	Use of faeces bucket	Faeces bucket emptied?	Urine bucket emptied?	Any smell?	Feels hygienic?	Cleaned?	Water use (L/day)
29/10/2012	2	-	Yes	-	Yes	Yes	10
30/10/2012	2	-	Yes	Yes	Yes	Yes	10
31/10/2012	1		Yes	-	-	-	-
1/11/2012	1	Yes	Yes	Yes	Yes	Yes	-
2/11/2012	1	No	Yes	No	Yes	Yes	-
3/11/2012	0	No	Yes	No	Yes	Yes	-
4/11/2012	2	Yes	Yes	Yes	Yes	Yes	-
5/11/2012	1	No	Yes	No	Yes	Yes	-
6/11/2012	1	No	Yes	Yes	Yes	Yes	-
7/11/2012	1	Yes	Yes	No	Yes	Yes	-
8/11/2012	2	No	Yes	Yes	Yes	Yes	-
9/11/2012	-	-	Yes	Yes	Yes	Yes	-
10/11/2012	1	No	Yes	Yes	Yes	Yes	-
11/11/2012	1	Yes	Yes	Yes	Yes	Yes	-
12/11/2012	2	No	Yes	Yes	Yes	Yes	-
13/11/2012	1	Yes	No	No	Yes	Yes	-
14/11/2012	-	No	Yes	No	Yes	Yes	-
15/11/2012	1	Yes	Yes	Yes	Yes	Yes	4
16/11/2012	-	-	-	-	-	-	-
17/11/2012	-	-	-	-	-	-	-
18/11/2012	-	-	-	-	-	-	-
19/11/2012	1	No	No	No	Yes	No	-
20/11/2012	1	No	Yes	No	Yes	Yes	2
21/11/2012	1	No	No	No	Yes	No	-
22/11/2012	1	No	Yes	Yes	Yes	-	-
23/11/2012	1	Yes	Yes	No	Yes	Yes	-

Table A9.5: Summary of diary entries by Participant F

Dates	Use of faeces bucket	Faeces bucket emptied?	Urine bucket emptied?	Any smell?	Feels hygienic?	Cleaned?	Water use (L/day)
29/10/2012	1	No	No	No	Yes	No	-
30/10/2012	1	No	No	No	Yes	No	-
31/10/2012	1	No	No	No	Yes	No	-
1/11/2012	1	No	No	No	Yes	No	-
2/11/2012	1	No	No	No	Yes	No	-
3/11/2012	-	Yes	Yes	No	Yes	No	2 - 3
4/11/2012	-	-	-	-	-	-	-
5/11/2012	1	Yes	Yes	No	Yes	No	-
6/11/2012	-	No	No	No	Yes	No	-
7/11/2012	1	No	No	No	Yes	No	-
8/11/2012	1	No	No	No	Yes	No	-
9/11/2012		No	No	No	Yes	No	-
10/11/2012	-	-	-	-	-	-	-
11/11/2012	1	No	No	No	Yes	No	-
12/11/2012	1	No	No	No	Yes	No	-
13/11/2012	1	No	No	No	Yes	No	-
14/11/2012	1	No	No	No	Yes	No	-
15/11/2012	1	No	No	No	Yes	No	-
16/11/2012	1	No	No	No	Yes	No	-
17/11/2012	-	Yes	Yes	No	Yes	No	2
18/11/2012	-	-	-	-	-	-	-
19/11/2012	-	No	No	No	Yes	No	-
20/11/2012	1	No	No	No	Yes	No	-
21/11/2012	1	No	No	No	Yes	No	-
22/11/2012	1	No	No	No	Yes	No	-
23/11/2012	1	No	No	No	Yes	No	-

Table A9.6: Summary of diary entries by Participant G

Dates	Use of faeces bucket	Faeces bucket emptied?	Urine bucket emptied?	Any smell?	Feels hygienic?	Cleaned?	Water use
29/10/2012	5	No	No	No	-	No	-
30/10/2012	2	Yes	Yes	Yes	Yes	No	-
31/10/2012	4	Yes	Yes	No	Yes	Yes	-
1/11/2012	-	-	-	-	-	-	-
2/11/2012	-	-	-	-	-	-	-
3/11/2012	-	-	-	-	-	-	-
4/11/2012	-	Yes	Yes	-	Yes	Yes	-
5/11/2012	3	No	Yes	Yes	Yes	No	-
6/11/2012	2	No	Yes	No	Yes	No	-
7/11/2012	-	-	-	-	-	-	-
8/11/2012	-	-	-	-	-	-	-
9/11/2012	-	-	-	-	-	-	-
10/11/2012	-	-	-	-	-	-	-
11/11/2012	-	-	-	-	-	-	-
12/11/2012	-	-	-	-	-	-	-
13/11/2012	3	-	-	-	-	-	-
14/11/2012	-	-	-	-	-	-	-
15/11/2012	-	-	-	-	-	-	-
16/11/2012	-	-	-	-	-	-	-
17/11/2012	-	-	-	-	-	-	-
18/11/2012	-	-	-	-	-	-	-
19/11/2012	-	-	-	-	-	-	-
20/11/2012	-	-	-	-	-	-	-
21/11/2012	-	-	-	-	-	-	-
22/11/2012	-	-	-	-	-	-	-
23/11/2012	-	-	-	-	-	-	-

Table A9.7: Summary of diary entries by Participant H

Dates	Use of faeces bucket	Faeces bucket emptied?	Urine bucket emptied?	Any smell?	Feels hygienic?	Cleaned?	Water use
29/10/2012	5	No	No	Yes	Yes	No	
30/10/2012	4	No	Yes	Yes	Yes	Yes	0.5
31/10/2012	1	No	Yes	No	Yes	No	-
1/11/2012	0	Yes	Yes	No	Yes	Yes	-
2/11/2012	1	-	-	-	-	-	-
3/11/2012	2	No	No	No	Yes	No	
4/11/2012	2	No	Yes	No	Yes	Yes	
5/11/2012	3	No	Yes	No	Yes	No	
6/11/2012	2	No	No	No	Yes	No	-
7/11/2012	2	-	Yes	No	Yes	Yes	
8/11/2012	1	Yes	No	No	Yes	No	-
9/11/2012	2	No	Yes	No	Yes	No	-
10/11/2012	2	No	Yes	-	-	-	-
11/11/2012	2	-	-	-	-	-	-
12/11/2012	3	No	Yes	No	Yes	No	-
13/11/2012	3	Yes	Yes	No	Yes	-	1
14/11/2012	3	No	Yes	No	Yes	No	-
15/11/2012	3	No	No	No	-	-	-
16/11/2012	2	Yes	No	No	Yes	Yes	-
17/11/2012	1	No	No	Yes	Yes	No	-
18/11/2012	1	No	No	Yes	Yes	No	-
19/11/2012	2	No	No	Yes	Yes	No	-
20/11/2012	3	Yes	Yes	Yes	Yes	Yes	1
21/11/2012	3	No	No	Yes	Yes	No	-
22/11/2012	4	No	Yes	Yes	-	Yes	-
23/11/2012	4	Yes	Yes	No	Yes	Yes	1

Table A9.8: Summary of diary entries by Participant I

Dates	Use of faeces bucket	Faeces bucket emptied?	Urine bucket emptied?	Any smell?	Feels hygienic?	Cleaned?	Water use
29/10/2012	3	Yes	Yes	Yes	Yes	Yes	-
30/10/2012	3	No	No	No	Yes	No	-
31/10/2012	-	No	Yes	No	Yes	No	-
1/11/2012	3	No	No	No	Yes	No	-
2/11/2012	3	Yes	Yes	No	Yes	Yes	-
3/11/2012	4	No	No	No	Yes	Yes	-
4/11/2012	3	No	Yes	No	Yes	Yes	-
5/11/2012	3	Yes	No	Yes	Yes	Yes	-
6/11/2012	3	No	Yes	No	Yes	No	-
7/11/2012	3	No	No	No	Yes	No	-
8/11/2012	3	Yes	Yes	No	Yes	Yes	-
9/11/2012	3	Yes	Yes	No	Yes	Yes	10
10/11/2012	3	No	Yes	No	Yes	Yes	-
11/11/2012	3	No	No	-	Yes	No	-
12/11/2012	3	Yes	Yes	No	Yes	Yes	10
13/11/2012	3	No	No	No	Yes	No	-
14/11/2012	3	No	Yes	No	Yes	No	3
15/11/2012	3	No	No	No	Yes	No	-
16/11/2012	3	No	Yes	No	Yes	No	-
17/11/2012	3	Yes	Yes	No	Yes	Yes	-
18/11/2012	3	No	No	No	Yes	No	-
19/11/2012	3	No	No	No	Yes	No	-
20/11/2012	3	No	No	No	Yes	No	-
21/11/2012	3	No	No	No	Yes	No	-
22/11/2012	3	No	Yes	No	Yes	No	3
23/11/2012	-	-	-	-	-	-	-

Table A9.9: Summary of diary entries by Participant J

Dates	Use of faeces bucket	Faeces bucket emptied?	Urine bucket emptied?	Any smell?	Feels hygienic?	Cleaned?	Water use (L/day)
29/10/2012	0	No	Yes	Yes	Yes	No	-
30/10/2012	0	No	No	No	Yes	No	-
31/10/2012	0	No	No	No	Yes	No	-
1/11/2012	-	-	-	-	-	-	-
2/11/2012	-	-	-	-	-	-	-
3/11/2012	1	Yes	Yes	Yes	Yes	Yes	0.1
4/11/2012	2	Yes	Yes	Yes	Yes	Yes	0.3
5/11/2012	0	No	Yes	Yes	yes	Yes	0.2
6/11/2012	1	Yes	No	yes	Yes	yes	0.2
7/11/2012	2	Yes	Yes	Yes	Yes	Yes	1
8/11/2012	1	No	No	Yes	Yes	No	-
9/11/2012	0	No	No	No	Yes	No	-
10/11/2012	1	Yes	Yes	Yes	Yes	Yes	0.1
11/11/2012	2	Yes	No	Yes	Yes	Yes	-
12/11/2012	0	No	No	Yes	Yes	Yes	-
13/11/2012	0	No	Yes	Yes	Yes	Yes	0.5
14/11/2012	2	Yes	No	Yes	Yes	Yes	1.5
15/11/2012	1	No	No	Yes	Yes	No	-
16/11/2012	1	Yes	Yes	Yes	Yes	Yes	-
17/11/2012	0	No	No	Yes	Yes	Yes	0.1
18/11/2012	0	No	No	Yes	Yes	No	-
19/11/2012	1	Yes	No	Yes	Yes	Yes	0.1
20/11/2012	1	Yes	Yes	Yes	Yes	Yes	0.5
21/11/2012	2	Yes	No	Yes	Yes	Yes	0.1
22/11/2012	1	Yes	Yes	Yes	Yes	Yes	0.3
23/11/2012	2	No	No	Yes	Yes	Yes	-

Table A8.10: Summary of diary entries by Participant K

Dates	Use of faeces bucket	Faeces bucket emptied?	Urine bucket emptied?	Any smell?	Feels hygienic?	Cleaned?	Water use (L/day)
29/10/2012	1	Yes	Yes	Yes	-	Yes	-
30/10/2012	0	No	Yes	No	Yes	Yes	2
31/10/2012	0	No	Yes	No	Yes	Yes	-
1/11/2012	0	No	Yes	Yes	Yes	Yes	-
2/11/2012	0	No	Yes	Yes	Yes	Yes	-
3/11/2012	1	Yes	Yes	Yes	Yes	Yes	-
4/11/2012	0	No	Yes	Yes	Yes	Yes	-
5/11/2012	1	Yes	Yes	No	Yes	Yes	-
6/11/2012	0	No	Yes	No	Yes	Yes	-
7/11/2012	1	Yes	Yes	No	Yes	Yes	-
8/11/2012	1	Yes	Yes	No	Yes	Yes	-
9/11/2012	0	No	Yes	No	Yes	Yes	-
10/11/2012	1	Yes	Yes	No	Yes	Yes	-
11/11/2012	1	Yes	Yes	No	Yes	Yes	-
12/11/2012	1	Yes	Yes	No	Yes	Yes	-
13/11/2012	0	No	Yes	No	Yes	Yes	-
14/11/2012	1	Yes	Yes	No	Yes	Yes	-
15/11/2012	0	No	Yes	No	Yes	Yes	-
16/11/2012	1	Yes	Yes	No	Yes	Yes	-
17/11/2012	1	Yes	Yes	No	Yes	Yes	-
18/11/2012	0	No	Yes	No	Yes	Yes	-
19/11/2012	1	Yes	Yes	No	Yes	Yes	-
20/11/2012	1	Yes	Yes	No	Yes	Yes	-
21/11/2012	0	No	Yes	No	Yes	Yes	-
22/11/2012	1	Yes	Yes	No	Yes	Yes	-
23/11/2012	1	Yes	Yes	No	Yes	Yes	-

Appendix 10: Survey results

A10.1 Results from the expressions of interest in the trial questionnaire

The survey used to collect expressions of interest in the trial (Appendix 1), also collected information about potential participants previous experience with possible emergency toilet options. The comments provided were assessed as being positive, negative or neutral (neither negative or positive, or both negative and positive). Only the responses from the 11 participants are included.

Question	Response	Assessment
Have you used a chemical toilet before?	No	6
	Yes	5
If yes, please comment on your experience	Caravan	<i>Neutral</i>
	On holidays - caravan/camping. Smelly and unclean.	<i>Negative</i>
	While were building a bach ... we used a chemical toilet without any issues or concerns	<i>Positive</i>
	At beach and rural visitor sites - generally malodorous and rickety, but you put up with it for the sake of the location.	<i>Neutral</i>
	Briefly while camping.	<i>Neutral</i>
Have you used a compost toilet before?	No	5
	Yes	6
If yes, please comment on your experience	We have installed a composting toilet at our bach. We also visit friends in Golden Bay who have a composting toilet. No smells or issues.	<i>Positive</i>
	Just once, at the chapel on a green burial site. Remarkably ordinary, really.	<i>Neutral</i>
	Only DOC facilities in forest parks.	<i>Neutral</i>
	I found it fine	<i>Positive</i>
	I really like them - they can get a little smelly though! Would like to see compost toilets become implemented in a sustainable way.	<i>Positive</i>
	All good - in the bush - DOC set up	<i>Neutral</i>
Have you used a port-a-loo before?	No	0
	Yes	11
If yes, please comment on your experience	Concerts etc.	<i>Neutral</i>
	On building sites. a bit like a chemical toilet	<i>Neutral</i>
	Only at festival type events. They tend to be unpleasant!	<i>Negative</i>
	Like the chemical ones: pongy but better than nothing.	<i>Neutral</i>
	Total of 20 days using portaloos during Christchurch earthquake sequence and Northern Japan Tsunami.	<i>Neutral</i>
	Had no problems	<i>Neutral</i>

Question	Response	Assessment
	Great for when you are out at a concert, but pretty dirty	<i>Neutral</i>
	Always a little gross, generally at music festivals where they are not that clean.	<i>Negative</i>
	Festivals - a bit grubby	<i>Negative</i>
	It was OK. The dark coloured ones are worse because at night it's really hard to see in them.	<i>Neutral</i>
	Average...	<i>Neutral</i>
Have you used a 'long drop' before?	No 1 Yes 10	
If yes, please comment on your experience	Tramping	<i>Neutral</i>
	On tramping trips. Smelly again.	<i>Negative</i>
	Numerous times! Some have been very "flied!"	<i>Neutral</i>
	Tramping.	<i>Neutral</i>
	Not my preferred option	<i>Negative</i>
	Pretty smelly from recollection, but it has been a few years since I used one.	<i>Negative</i>
	Long drops are great - but figure that you could use human waste for better things e.g. compost for the garden	<i>Positive</i>
	Yes - all fine	<i>Positive</i>
	Smelly but authentic	<i>Negative</i>
	Smelly!	<i>Negative</i>

A10.2 Pre-trial survey

Question	Response	
How easy do you think the compost toilets will be to use?	Very comfortable	0
	Comfortable	4
	Neither comfortable nor uncomfortable	5
	Uncomfortable	0
	Very uncomfortable	0
Compared to a long drop, port-a-loo or chemical toilet what do you think the benefits of a compost toilet will be?	<ul style="list-style-type: none"> • Can be dealt with on site and look to be pretty low-tech. • Less smell and general intrusiveness • Easier to take care off. • I hate portaloos! The chemical smell is gross. • Eco friendly. Less smelly. • Cleaner and less smelly. Portaloos are very smelly • No chemicals maybe less water • Seems a bit more 'natural' than a chemical and less 'unknown' than a long drop.....can also do your garden some good. • The composting toilet does not use the toxic chemicals that are in port-a-loos or chemical toilets. The composting toilet is far easier to clean & maintain than a long drop 	
What do you think the disadvantages of a compost toilet will be?	<ul style="list-style-type: none"> • Smells, the need to move the contents, and perception. • More direct effort • Smelly • Smell, unless I can get hold of a lot of macrocrapa shavings • More hassle than flushing. • Needing to carry out waste. • Smells, germs. Can't just flush and forget - need to understand the composting process and how to manage it. • The extra process of emptying/cleaning the buckets - especially if friends 'drop in'....rather than checking the kids have flushed it might be a mad dash to empty the toilet! • None I can think of. 	
How comfortable would you feel about the short term (1 - 2 weeks) use of a compost toilet after a disaster?	Very comfortable	3
	Comfortable	4
	Neither comfortable nor uncomfortable	1
	Uncomfortable	1
	Very uncomfortable	0

Question	Response			
From the following options rank which would be your preferred options for short term use after a disaster?	Chemical toilet	Port-a-loo	Compost toilet	Bury
	Preferred	Least preferred	Most preferred	Less preferred
	Less preferred	Preferred	Most preferred	Least preferred
	Most preferred	Least preferred	Preferred	Less preferred
	Less preferred	Preferred	Most preferred	Least preferred
	Less preferred	Most preferred	Preferred	Least preferred
	Least preferred	Preferred	Most preferred	Less preferred
	Less preferred	Most preferred	Preferred	Least preferred
	Least preferred	Least preferred	Most preferred	Preferred
	Least preferred	Preferred	Most preferred	Less preferred
How comfortable would you feel about the longer term use (at least 3 months) of a compost toilet after a disaster	Very comfortable			3
	Comfortable			4
	Neither comfortable nor uncomfortable			1
	Uncomfortable			1
	Very uncomfortable			0
From the following options rank which would be your preferred options for long term use after a disaster?	Chemical toilet	Port-a-loo	Compost toilet	Bury
	Preferred	Most preferred	Less preferred	Least preferred
	-	-	Preferred	Least preferred
	Most preferred	Less preferred	Preferred	Least preferred
	Less preferred	Preferred	Most preferred	Least preferred
	Preferred	Less preferred	Most preferred	Least preferred
	Least preferred	Preferred	Most preferred	Less preferred
	Less preferred	Preferred	Most preferred	Least preferred
	Less preferred	Least Preferred	Most preferred	Preferred
Least preferred	Preferred	Most preferred	Less preferred	
How often do you clean your toilet?	Daily			2
	Every couple of days			3
	Weekly			3
	Other			0

Question	Response				
For the purpose of the trial we will be collecting the solid waste. In an actual emergency which option do you think you would do?	<table border="1"> <tr> <td data-bbox="533 293 1075 338">Store for waste collection</td> <td data-bbox="1075 293 1398 338">5</td> </tr> <tr> <td data-bbox="533 338 1075 394">Use as compost</td> <td data-bbox="1075 338 1398 394">3</td> </tr> </table>	Store for waste collection	5	Use as compost	3
	Store for waste collection	5			
Use as compost	3				
Any other comments/thoughts or feelings?	<ul style="list-style-type: none"> • Would like to be able to use as compost but not sure we'd have enough space at home and a work that there would be too much to deal with... Could be wrong but that the perception at the moment. • I'd like to believe I'd learn how to make good safe usable compost but in real emergency circumstances I'd have other things to worry about and I'd probably much prefer to have it taken away and processed professionally for health/safety reasons as well as convenience. • If the toilet is used for a long period (number of months) may need to store for collection. <ul style="list-style-type: none"> • Great to be running the trial and even before starting to use it he toilet it's been an excellent conversation starter and has thus generated a lot of discussion around emergency preparedness etc. • Completing this after 5 days; before it started I was getting distinctly uneasy about it all. • Excellent that a trial is occurring • This trial is a very good idea. I hope it goes well. • Kids were very reluctant to use them when they saw them, once they had 'decorated' them they changed their minds - youngest has already snuck in and used it a couple of times! 				

A10.3 Mid-trial survey

Question	Response										
How easy are the compost toilets to use?	<table border="1"> <tr> <td>Very comfortable</td> <td>3</td> </tr> <tr> <td>Comfortable</td> <td>3</td> </tr> <tr> <td>Neither comfortable nor uncomfortable</td> <td>2</td> </tr> <tr> <td>Uncomfortable</td> <td>0</td> </tr> <tr> <td>Very uncomfortable</td> <td>0</td> </tr> </table>	Very comfortable	3	Comfortable	3	Neither comfortable nor uncomfortable	2	Uncomfortable	0	Very uncomfortable	0
Very comfortable	3										
Comfortable	3										
Neither comfortable nor uncomfortable	2										
Uncomfortable	0										
Very uncomfortable	0										
What have been the positive experiences?	<ul style="list-style-type: none"> • Learned a skill that I might (heaven forbid) be thankful for. Feel I've contributed to a very valuable trial. • Learning how simple compost WCs are. An unexpected positive work experience gets a few laughs! The lack of smell or muck which was creating a little anxiety. • It's been a learning experience • Taking part in a trial that will have positive benefits in the event of a civil disaster • Less smelly and challenging than I had feared it would be. And the smell of fresh hay is pleasant. • Using less water which is a bonus. The overall design is much better than anticipated - the buckets are bigger and it feels 'robust'. • Taking time out of my day to poo. It's in the laundry which is detached from home. It's nice to just sit there... • Surprise at how easy it has been to use it. 										
What have been the negative experiences?	<ul style="list-style-type: none"> • The need to move relatively heavy buckets at the risk of a trip & spill! The potential for anxiety when using the #2 bucket and doing a lot of #1. • The stench of pee permeating around the house Carrying the pee and poo and cleaning the buckets • None (other than a few smells...) • Separating outputs requires thought; and remembering not to drop paper in the pee pail is tricky, especially when half asleep. • Kids over-shooting the 'wees' bucket. Daily emptying of them. • Takes too much effort to get the pee bucket out. • None • Kids have lost their enthusiasm for them - don't like shifting from seat to seat for 1's and 2's. They also don't like having to put the loo paper in a different bucket when they wee. 										
Were the instructions at the briefing adequate?	<table border="1"> <tr> <td>Yes</td> <td>4</td> </tr> <tr> <td>No</td> <td>0</td> </tr> <tr> <td>Did not attend briefing</td> <td>4</td> </tr> </table> <ul style="list-style-type: none"> • Didn't attend but the info at the install time was more than adequate. • Glanced over the material provided and it all seemed pretty straight-forward. • The info given their combined with the info sheets was ample. 	Yes	4	No	0	Did not attend briefing	4				
Yes	4										
No	0										
Did not attend briefing	4										

Question	Response	
Compared to a long drop, port-a-loo or chemical toilet what do you think the benefits of a compost toilet are?	<ul style="list-style-type: none"> • The privacy of being in your own workplace or home. The use of the nutrients on site... • More environmentally friendly. • Ease of use, less smell, cleaner. • More self-contained and then a port-a-loo, and indoors. Less set-up effort than a long-drop - and indoors! • You can be in the comfort of your own home as (opposed to outside with a long drop or port-a-loo), and no chemicals. And from what I have seen the chemical toilets are quite small? • Long drops are smelly. SMELLY. And, chemicals are also smelly. • Lack of smell; ease of cleaning; absence of toxic chemicals; it can be used inside 	
What do you think the disadvantages of a compost toilet are?	<ul style="list-style-type: none"> • The use of the nutrients on site... • Heavy for the elderly to carry. • Tricky carrying down the stairs • Finding suitable material on an on-going basis to cover poo.... • Everyone emptying pee outside might be challenging in urban spaces; especially if there is no mains water to dilute it. • Emptying of the wheelie bin if it was happening on a large scale. • Potential for lots of flies. • Depending on the season and number of users, possible 'flooding' under the lemon trees! • Taking time to poo. It's probably quite a bit longer than in a normal loo, I think. • None I can think of. 	
How often are you cleaning your compost toilet?	<p style="text-align: right;">Daily</p> <p style="text-align: center;">Every couple of days</p> <p style="text-align: right;">Weekly</p> <p style="text-align: right;">Other</p>	<p style="text-align: right;">3</p> <p style="text-align: right;">3</p> <p style="text-align: right;">2</p> <p style="text-align: right;">0</p>
Is this a change from your regular cleaning schedule?	<p style="text-align: right;">Increase</p> <p style="text-align: center;">About the same</p> <p style="text-align: right;">Decrease</p>	<p style="text-align: right;">4</p> <p style="text-align: right;">3</p> <p style="text-align: right;">1</p>
How much water, per day, are you using in the compost toilet and cleaning?	<p style="text-align: right;">< 1</p> <p style="text-align: center;">1 - 2</p> <p style="text-align: center;">3 - 6</p> <p style="text-align: center;">7 - 11</p> <p style="text-align: right;">> 12</p>	<p style="text-align: right;">2</p> <p style="text-align: right;">1</p> <p style="text-align: right;">4</p> <p style="text-align: right;">1</p> <p style="text-align: right;">0</p>
How comfortable would you feel about the short term (1 - 2 weeks) use of a compost toilet after a disaster?	<p style="text-align: right;">Very comfortable</p> <p style="text-align: center;">Comfortable</p> <p style="text-align: center;">Neither comfortable nor uncomfortable</p> <p style="text-align: center;">Uncomfortable</p> <p style="text-align: left;">Very uncomfortable</p>	<p style="text-align: right;">3</p> <p style="text-align: right;">5</p> <p style="text-align: right;">0</p> <p style="text-align: right;">0</p> <p style="text-align: right;">0</p>

Question	Response			
From the following options rank which would be your preferred options for short term use after a disaster?	Chemical toilet	Port-a-loo	Compost toilet	Bury
	Less preferred	Preferred	Most preferred	Least preferred
	Preferred	Least preferred	Most preferred	Least preferred
	Most preferred	Preferred	Less preferred	Least preferred
	Preferred	Less preferred	Most preferred	Least preferred
	Preferred	Less preferred	Most preferred	Least preferred
	Less preferred	Least preferred	Most preferred	Preferred
	Less preferred	Preferred	Most preferred	Least preferred
Preferred	Less preferred	Most preferred	Least preferred	
How comfortable would you feel about the longer term use (at least 3 months) of a compost toilet after a disaster	Very comfortable Comfortable Neither comfortable nor uncomfortable Uncomfortable Very uncomfortable			1 4 1 2 0
From the following options rank which would be your preferred options for long term use after a disaster?	Chemical toilet	Port-a-loo	Compost toilet	Bury
	Less preferred	Preferred	Most preferred	Least preferred
	Preferred	Less preferred	Most preferred	Least preferred
	Most preferred	Preferred	Less preferred	Least preferred
	Preferred	Less preferred	Most preferred	Least preferred
	Most preferred	Less preferred	Preferred	Least preferred
	Less preferred	Least preferred	Most preferred	Preferred
	Preferred	Less preferred	Most preferred	Least preferred
Preferred	Less preferred	Most preferred	Least preferred	
Do you have any further comments or issues to note?	<ul style="list-style-type: none"> • It's a worthwhile exercise and I'm glad I had the opportunity to take part. I hope it turns out well. • I have been surprised at some people's unwillingness to use the toilet. • I would never bury plastic bags in my yard - bury waste maybe, but not in plastic bags. • I'm out a lot these days. Some days I go out very early and come home late. I'm on the dole so you'd expect me to be home more, but even I am surprised by how little I'm at home. 			

A10.4 Post-trial survey results

Question	Response										
How easy were the compost toilets to use?	<table border="0"> <tr> <td style="text-align: right;">Very comfortable</td> <td style="text-align: right;">4</td> </tr> <tr> <td style="text-align: right;">Comfortable</td> <td style="text-align: right;">4</td> </tr> <tr> <td style="text-align: right;">Neither comfortable nor uncomfortable</td> <td style="text-align: right;">0</td> </tr> <tr> <td style="text-align: right;">Uncomfortable</td> <td style="text-align: right;">0</td> </tr> <tr> <td style="text-align: right;">Very uncomfortable</td> <td style="text-align: right;">0</td> </tr> </table>	Very comfortable	4	Comfortable	4	Neither comfortable nor uncomfortable	0	Uncomfortable	0	Very uncomfortable	0
Very comfortable	4										
Comfortable	4										
Neither comfortable nor uncomfortable	0										
Uncomfortable	0										
Very uncomfortable	0										
What have been the positive experiences?	<ul style="list-style-type: none"> • Relative ease of maintenance. Waste that could be put to use. Proof that the idea could work in many circumstances • Less water wasted, much cleaner/easier than expected. • Easy to use. Lots of free nitrogen for the garden • The improved use of resources from not flushing potable water down the sewer! And the ability to keep nutrients on site. • simple and well-thought out package • Easier than I had expected, all round - easier to use and to clean. • Trying something new Being part of an important trial • Ease of cleaning. 										
What have been the negative experiences?	<ul style="list-style-type: none"> • Difficulty in cleaning the plywood surfaces • Straw everywhere • Extra ~10 minutes a day emptying/cleaning - but not really a big deal. • Less room in the bathroom. • The occasional "agricultural" smells... • Perception (as opposed to reality) for some. Also the pending considerations of what will become of the growing wheelie bin of poo • Bit of extra smell • It's a bit tiresome having to empty the liquid every day; separating liquid and solid is a bit annoying; and remembering not to drop paper in pee was a pain. • Smells Having to carry the buckets down the stairs every day • None I can think of. 										
Any other comments	<ul style="list-style-type: none"> • Kids came round after a rough middle patch of not wanting to use them. Recommend diluting urine bucket outside or where there is good air flow. • Good to be part of a trial that may make Wellington more resistant to disaster. • My 4 year old used it and all the pee missed the bucket despite his best efforts, realize now that it would need to be raised for small children. • In the awful event of needing to use this, I feel toilet replacement at least will be painless. 										
Were the instructions at the briefing adequate?	<table border="0"> <tr> <td style="text-align: right;">Yes</td> <td style="text-align: right;">4</td> </tr> <tr> <td style="text-align: right;">No</td> <td style="text-align: right;">0</td> </tr> <tr> <td style="text-align: right;">Did not attend briefing</td> <td style="text-align: right;">4</td> </tr> </table>	Yes	4	No	0	Did not attend briefing	4				
Yes	4										
No	0										
Did not attend briefing	4										

Question	Response
	<ul style="list-style-type: none"> • The information I was given was all straight forward and easy to follow. • The info I got directly (as I missed the briefing) was fine except I wasn't quite clear on how to handle the poo if in a real situation it stayed on site, i.e.- how deep to bury it, and how long before that ground is OK to grow veges again...
<p>Compared to a long drop, port-a-loo or chemical toilet what do you think the benefits of a compost toilet are?</p>	<ul style="list-style-type: none"> • Relatively easy to use for most able bodied people • Waste is easily stored until collection can be arranged • Units could fit in most houses • A unit in each house would be better than sharing port-a-loos • Can be made to feel more hygienic than a port-a-loo • No proprietary chemicals needed • Easier installation than a port-a-loo, slightly harder than a small chemical toilet • Waste easier to store and collect than port-a-loos and chemical toilets • More choice as to where you can have it (compared with long drop or port-loo). • Haven't ever used a chemical toilet but imagine it would use chemicals - which is a negative. • Easier to manage, less "exposure". cleaner, less "impactful" on the wider environment • Privacy and personalization, indoors and probably in your existing bathroom • Does not need a waste treatment system/plant. • Excellent, simple, sensible • Indoors, comfortable, low-pong, and the supplies are largely available in the garden. • More environmentally friendly. • Easy to sort out • Can be set up inside, easy to clean, no toxic chemicals
<p>What do you think the disadvantages of a compost toilet are?</p>	<ul style="list-style-type: none"> • Comparatively bulky waste (even if it isn't heavy) • Odour problems if waste is wet • Large volumes of dry material required • The units as tested may not be as robust as a port-a-loo • Obtaining saw-dust and straw. • Space that it takes up if inside. • Possibly obtaining suitable "aerating" material (such as straw) during an emergency • Perception and some sites ability to deal with the pee and poo in the short term. • If you didn't have any garden it could be a problem. • For urban settings, disposing of the 'leftovers' would be a challenge. • Large bathroom required • None I can think of

Question	Response	
How often are you cleaning your compost toilet?	Daily	3
	Every couple of days	2
	Weekly	2
	Other	0
Is this a change from your regular cleaning schedule?	Increase	3
	About the same	4
	Decrease	1
How much water (litres), per week, are you using in the compost toilet and cleaning?	< 1	0
	1 - 2	2
	3 - 6	3
	7 - 11	0
	> 12	3
For the purpose of the trial we collected the solid waste. In an actual emergency which option do you think you would do?	Store for waste collection	1
	Use as compost	7
	<ul style="list-style-type: none"> • I think use as compost would work best if you were already making compost. The waste as it was may not have turned easily into compost by itself. If, as is likely in a situation where the composting toilets were being used, other services were disrupted it might be useful to provide advice on generic compost making to use the compatible food scraps and garden waste that people might otherwise be putting into normal rubbish collections - minimising material that would go uncollected for a prolonged period. • Maybe bury it in large doses (as in every few weeks/when it was obvious it needed to be disposed of) • We have compost bins already, but think we would keep it separate • I could process it in the garden if I had to; but I'd be worried about using it on the garden without being sure it had reached a high enough temperature to destroy any harmful micro-organisms. 	
How comfortable would you feel about the short term (1 - 2 weeks) use of a compost toilet after a disaster?	Very comfortable	6
	Comfortable	2
	Neither comfortable nor uncomfortable	0
	Uncomfortable	0
	Very uncomfortable	0

Question	Response			
From the following options rank which would be your preferred options for short term use after a disaster?	Chemical toilet	Port-a-loo	Compost toilet	Bury
	Less preferred	Least preferred	Most preferred	Preferred
	Least preferred	Less preferred	Most preferred	Preferred
	Less preferred	Preferred	Most preferred	Least preferred
	Preferred	Least preferred	Most preferred	Less preferred
	Least preferred	Preferred	Most preferred	Less preferred
	Preferred	Least preferred	Most preferred	Less preferred
	Most preferred	Less preferred	Preferred	Least preferred
	Preferred	Less preferred	Most preferred	Least preferred
How comfortable would you feel about the longer term use (at least 3 months) of a compost toilet after a disaster	Very comfortable			4
	Comfortable			3
	Neither comfortable nor uncomfortable			1
	Uncomfortable			0
	Very uncomfortable			0
From the following options rank which would be your preferred options for long term use after a disaster?	Chemical toilet	Port-a-loo	Compost toilet	Bury
	Least preferred	Less preferred	Most preferred	Preferred
	Least preferred	Preferred	Most preferred	Less preferred
	Less preferred	Preferred	Most preferred	Least preferred
	Preferred	Less preferred	Most preferred	Least preferred
	Less preferred	Preferred	Most preferred	Least preferred
	Preferred	Least preferred	Most preferred	Less preferred
	Most preferred	Preferred	Less preferred	Least preferred
	Preferred	Less preferred	Most preferred	Least preferred
Did WREMO provide you with sufficient support and information during the trial?	Yes			8
	No			0
Was there anything we could have done differently?	<ul style="list-style-type: none"> • Not that I can think of..... • Nothing comes to mind! • All good ... except we started using matches and a candle later in the trial to deal with slight funky smell - worked really well too. • No (x2) • Not that I can think of. 			
Do you have any further comments or issues to note?	<ul style="list-style-type: none"> • It has been great to be part of the trial!! • I think it was very worthwhile and provided our office with an insight to the simplicity and logic of a composting WC. It has helped highlight to me the wastefulness in our current sewer infrastructure that seems like an out of date solution. • With only 2 of us we could have continued using the wheelie bin storage for 3 months easily. 			