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Waste Audit Results

for University of Canterbury, August 2017

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September 2017

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1. INTRODUCTION

Our Daily Waste specialises in waste prevention education, customised recycling signage, and we also provide comprehensive waste audits that analyse bin user behaviour and how behaviour change can be put into effect.

Below are the results of an audit of the comingled recycling, landfill, organics, and paper streams undertaken at the University of Canterbury, August 2nd to 21st. Carried out over three weeks, waste was taken daily from a different part of the campus each week including: The Undercroft, UCSA kitchens, and C Block/Karl Popper building.

As such, we cannot provide a full overview of the UC's waste output, but this audit does provide valuable information about contamination rates and how the bins are being used. It also indicates a number of waste items that could easily be eliminated from the UC's waste stream, which in turn would reduce the UC's waste output and costs.

This report is also informed by my knowledge of the UC's waste system and previous audits from my time as the Waste Reduction Educator in 2011/12 but all recommendations are based on what I would tell any of my clients: how to use the results as a positive education and media tool to promote the UC and save money on waste fees through committed waste prevention.

2. HEALTH & SAFETY

ODW takes Health & Safety seriously and all staff were fully briefed in our own H&S policy, along with the UC's, and both were complied with at all times. All H&S requirements (gloves, hand sanitiser, first aid kit etc.) were provided by ODW. There were no incidents or injuries incurred during the audit.

3. METHODOLOGY

The following methodology was used:

- Waste was collected daily from the agreed location by an FM staff member and delivered to the waste yard.
- All bags of landfill were audited first, followed by recycling and paper streams.
- Organics was weighed but not sorted.
- Individual bags were opened separately and placed on a table whereby staff sorted each category of waste into buckets and wheelie bins according to volume.
- Recycling was further sorted into 'clean' and 'contaminated' categories.
- Once all waste from that stream was sorted, each category was weighed and recorded.
- At end of each day's audit, waste was disposed of into appropriate skips and bins and the area left tidy.

Figure 1 The separation of items from bins

4. LOCATIONS and SAMPLE SIZE

4.1 Locations

The following locations were chosen because they were the subject of a waste audit carried out in 2014:

- Undercroft – audited Monday, 31st July to Sunday, 6th August
- UCSA Production Kitchens (UCSA PK) - audited Monday, 7th August to Sunday, 13th August
- C Block Theatres and Karl Popper building - audited Monday, 14th August to Sunday, 20th August

4.2 Sample Size – Pre-sort

A total of 617kgs was classified, in contrast with 566kgs audited in 2014. Volume wise, the bulk of waste was landfill, followed by general recycling. There was only three days where there was paper to audit so the data for the paper stream is not as robust as the other three streams.

The table below indicates how the bins are being used and how much of each stream is going in the correct bin. Organics has been included in the pre-sorted list but not after as there was not the time or facilities to sort this stream.

Table 1 Total weight of waste per stream classified in origin and after sorting (kg's).

Waste Stream	Container/Bin Used - kgs	After Sorting kgs	% Waste In Correct Bin
General Recycling	94.9	66.1	70%
Landfill	345.6	193.1	56%
Paper	31.1	23.3	75%
Organics	145.5		

A more detailed breakdown of each stream follows but these results offer the first indication of how the bins are being used. As a chart the amount of waste going to each stream through the bins is as follows:

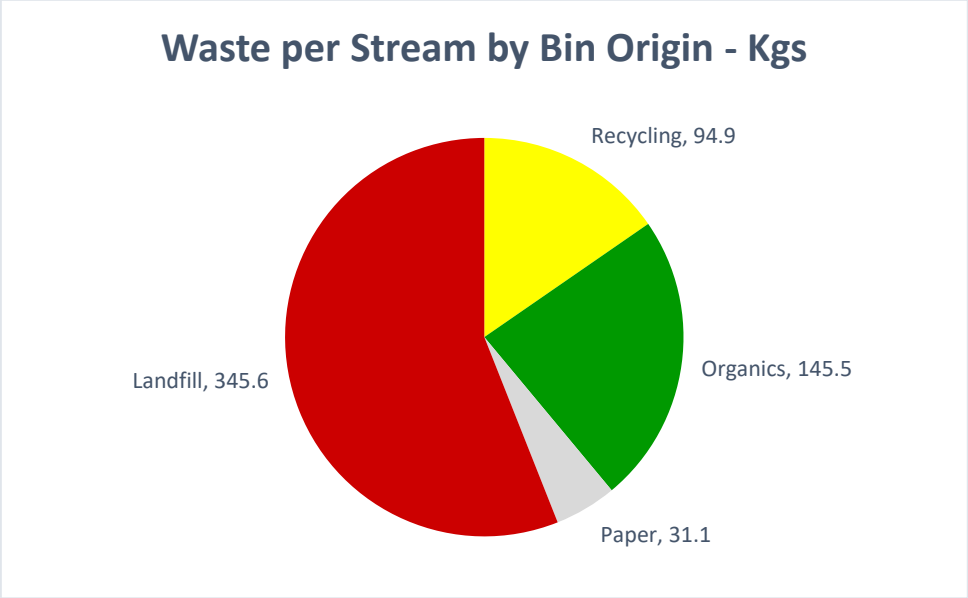

Figure 2 Waste per stream by Bin Origin – kg's

This shows that the vast amount of bin users are using the landfill bins regardless of what it is they are binning with only 56% of the original landfill weight being landfillable items. A full breakdown of each separate stream will be included below, but the following section shows the weights per stream after classification.

5. OVERALL RESULTS AND OBSERVATIONS

5.1 Breakdown of Waste per Stream by Weight

The comparison of the above chart with the one below (which shows the weight per stream after waste had been sorted into categories) highlights that food waste is one of the biggest challenges the UC faces with regards to waste reduction.

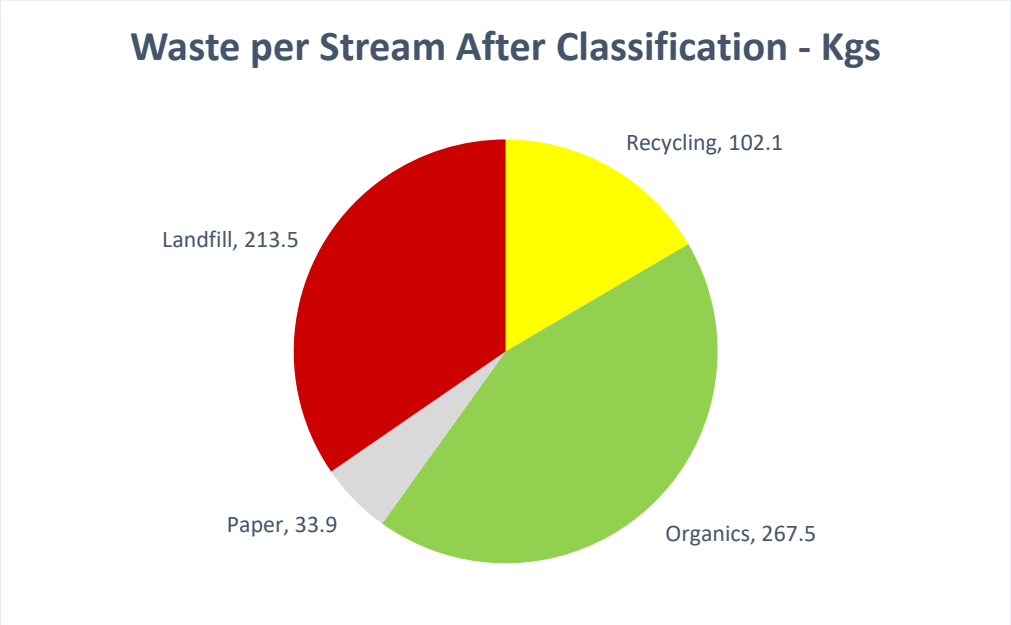

Figure 3 Waste per stream after classification – kg's

Whilst the relatively low figures of the amount of general recycling and paper going to the wrong streams are positive, the comparison between the two charts shows that there is more organics by weight being binned overall and only a little over half of it (145kg) is going to the organics bins. Some of this can be accounted for by the UCSA production kitchens where there seems to be some confusion over what can go to organics but a lot was also from regular bin users who do not sort their waste and leave food waste inside the packaging before putting it in landfill.

5.2 Breakdown of Waste per Stream by Percentage

As a percentage the same data indicates where the UC most needs to focus its attention with more than three quarters of the waste made up from landfill and organics combined, both of which are usually charged at far higher rates than paper or general recycling. Organics takes up less volume, but as the heaviest stream it can be difficult to lift in large volumes, and with so much going to the landfill streams, it could make these bags abnormally heavy which can have H&S implications for staff handling the waste.

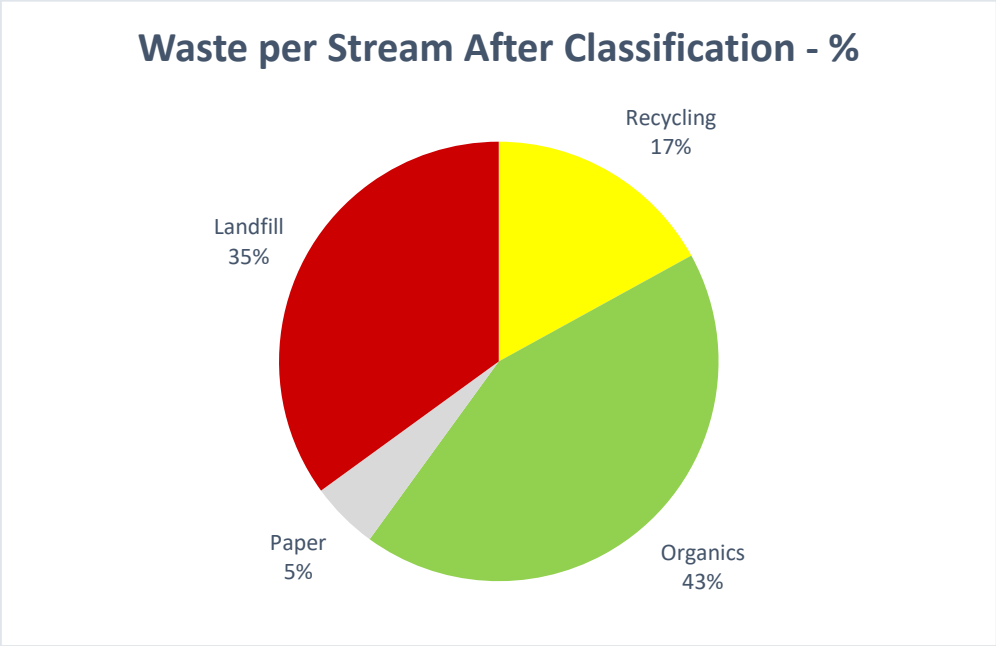

Figure 4 Waste per stream after classification by percentage

6. COMINGLED RECYCLING

The fact that the comingled recycling makes up only a small portion of the total weight audited is due to the following reasons:

- Comingled recycling is generally bulkier but lighter than other types of waste.
- Lower recycling overall can also indicate that sustainability initiatives such as encouraging students to use reusable drink bottles are working.

6.1 Breakdown of Comingled Recycling by Stream

The actual amount of items that would be recyclable from the recycling bins was even lower than the above figures suggest with only 54% of the total waste found in the recycling bags made up of recyclable items that were also clean enough to recycle (Fig. 5).

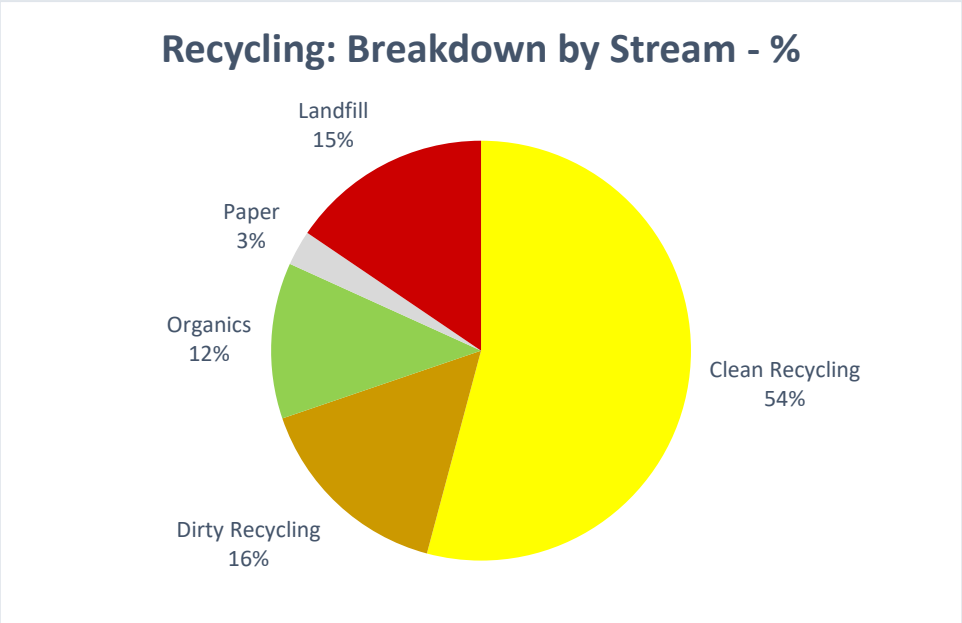

Figure 5 Recycling breakdown by stream - Percentage

Fortunately, the UC has a system in place whereby some of the contamination from the recycling bags is removed before collection by Cleaning Services staff so that there is less risk of the bins being rejected outright for being too contaminated, which would certainly be the case based on these figures.

6.2 Breakdown of Recyclable Items by Category – Clean and Contaminated

Of the total recyclable items that were put in the recycling bins over three quarters of them were clean enough to recycle, although some categories such as aluminium cans fare better than others, as shown by the chart below (Fig. 6).

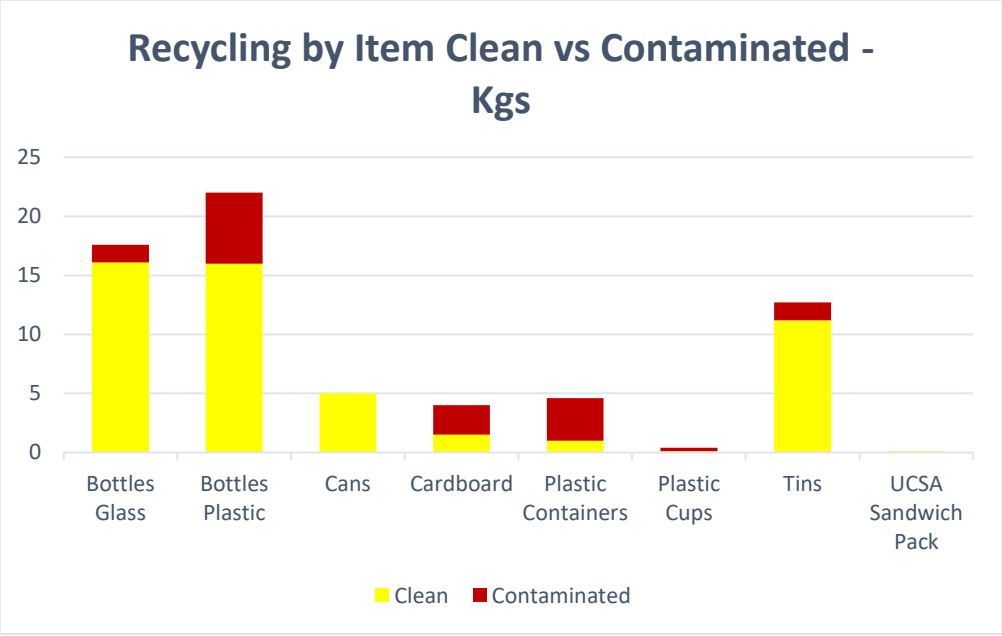

Figure 6 Split of clean to contaminated Items in Recycling stream in Kgs

In general, this shows that the message about making sure that recycling is clean and rinsed is getting through but there could be some improvement.

6.3 Landfill Contamination in Recycling

Aside from the recyclables that were too dirty to recycle (15%), a further 15% of the recycling bags was made up of items that should have gone into the landfill stream. Fig. 7 shows a recycling bag contaminated with food, soft plastics, and dirty paper.

Figure 7 A recycling bag contaminated with food, soft plastics, and dirty paper.

The chart below (Fig. 8) shows the breakdown of landfillable items in the recycling. The non-recyclable paper represents all paper items that were either too dirty (paper bags, tissues, handy towels etc.) or paper items that are not recyclable (plastic/wax composites etc.) and it is by far the category that creates the most confusion.

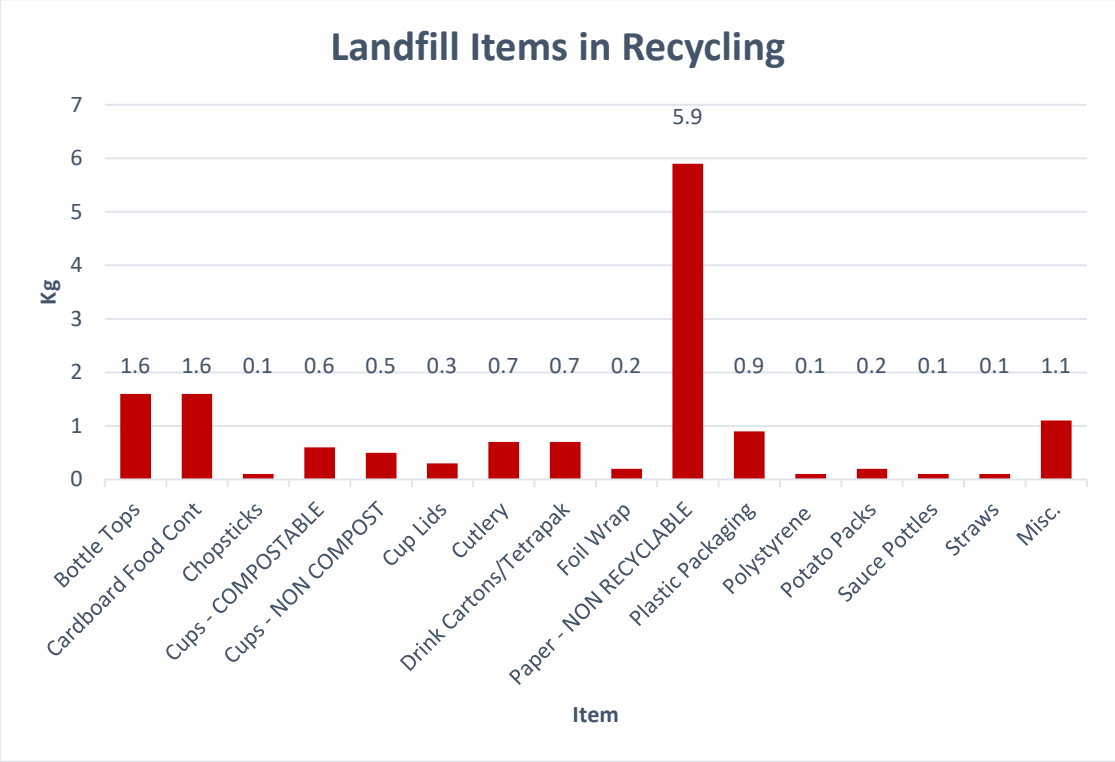

Figure 8 Breakdown of landfill in the recycling

6.4 Food Contamination in Recycling

At 12% of all recycling, there was a relatively low amount of food in the recycling compared to landfill, but it is still highly problematic for the following reasons:

- Food and liquids are the items most likely to stain good recyclables such as paper and cardboard, rendering them non-recyclable.
- Waste collectors are more likely to reject recycling bins with visible food contamination.
- Whether the recycling bin is taken directly to the recycling sorting centre or to landfill the outcome for the food will likely be landfill, where it breaks down and creates harmful CO^2 gases.

Figure 9 Food contamination in the Recycling bins

7. LANDFILL

Overall, there was less landfill (213.5kg) by weight than organics (267.5kg), but because organics is one of the heaviest waste streams, landfill was far greater in volume, with at least three overloaded frontload skips being disposed of daily, compared to less than two paper skips of the same size (see Fig. 10).

Figure 10 Skips at the University Campus

One of the main reasons for such high volumes of landfill is that after the earthquakes the 'temporary' cafés were built without dishwashing facilities, meaning that even if you dine at the cafe, the cups, plateware and cutlery are all disposable. Aside from the compostable cups being collected in a separate stream, these items are not currently able to be diverted from landfill. The Shilling Club is an example of a café where reusable crockery plates are available but the majority of the affordable student cafés now only offer disposable service-ware unless the customer brings their own reusable alternative. As such, the UC will be paying unnecessarily high waste fees and will continue to do so until such time as the cafés are rebuilt with dishwashing facilities

7.1 Breakdown of Landfill by Stream

That only 13% of the landfill was made up of recyclables (recycling and clean paper) is a positive sign that the message is getting through about recycling where possible. However, with 31% made up of food there is a lot of work to be done to bring this number down, especially because the organics stream is charged at a lower rate than landfill.

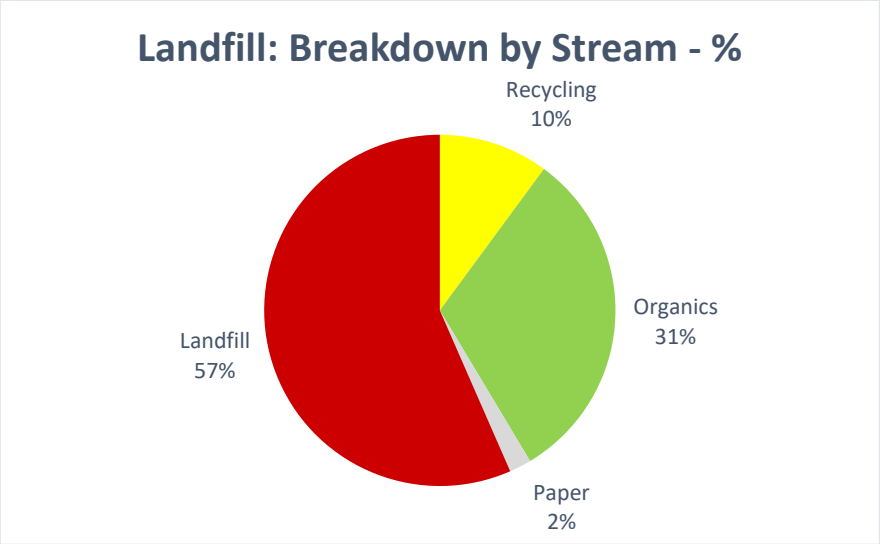

Figure 11 Landfill breakdown by stream – Percentage

7.2 Breakdown of Landfill Items by Category

In order to get the fullest possible understanding of a client's waste output, waste is sorted into a number of sub-categories, particularly where there are large numbers of a specific item (tomato sauce pottles, straws etc.) that might otherwise be included in plastic packaging. As such, the charts below have been separated into items over and under 5kg.

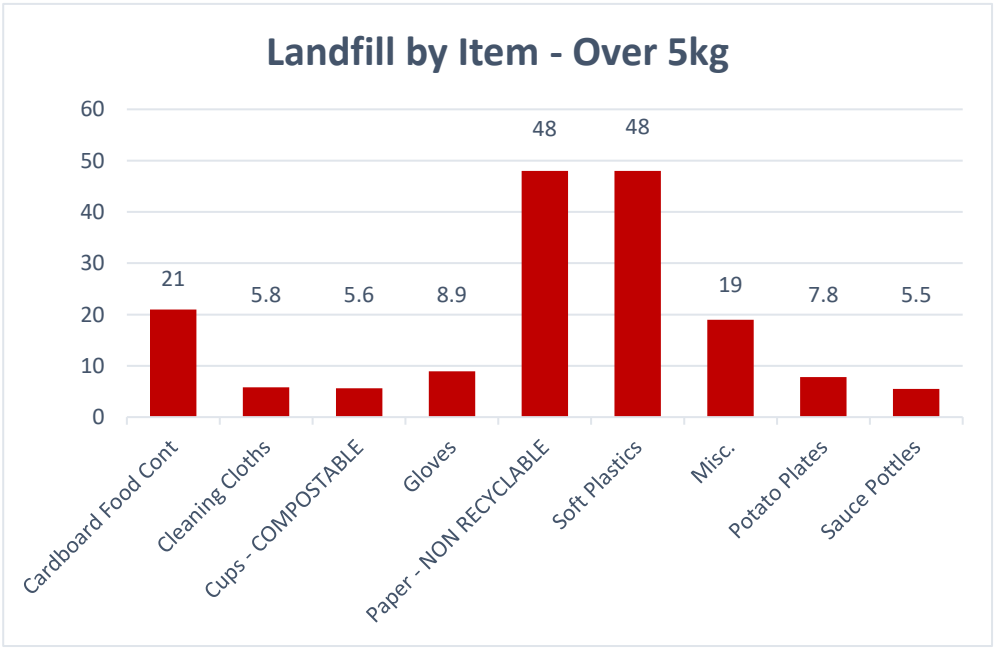

Figure 12 Landfill by items over 5kg

That there was as much soft plastic by weight as paper indicates the large amounts of plastic packaging being landfilled daily, the vast majority of which (41.9kg) was from the UCSA PK, as were all of the gloves and cleaning cloths (see below for an analysis by area). The sauce pottles category shown here included mayo, butter and jam condiments, whilst single serve tomato sauces are included separately below.

Figure 13 From L to R: Sauce Pottles, Full Tomato Sauces, a full 240L wheelie bin of soft plastics

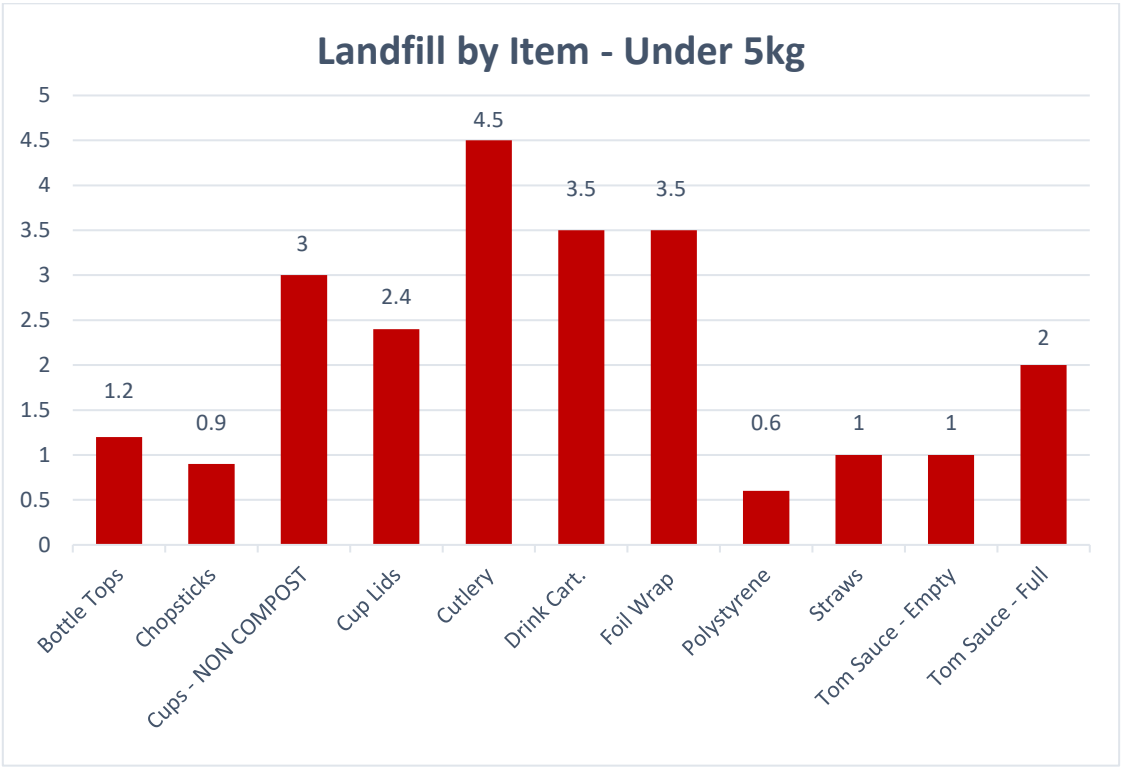

Figure 14 Analysis of landfill by item under 5kg

The tomato sauce sachets were divided into 'empty' and 'full' categories because so many had not been opened indicating that the cafés are either giving them away, or customers are buying them without wanting to use them. All the single serve condiments could easily be replaced with reusable alternatives.

7.3 Recycling in Landfill

Recycling in the landfill only made up 11% but the following chart shows the items that could have been put into the recycling.

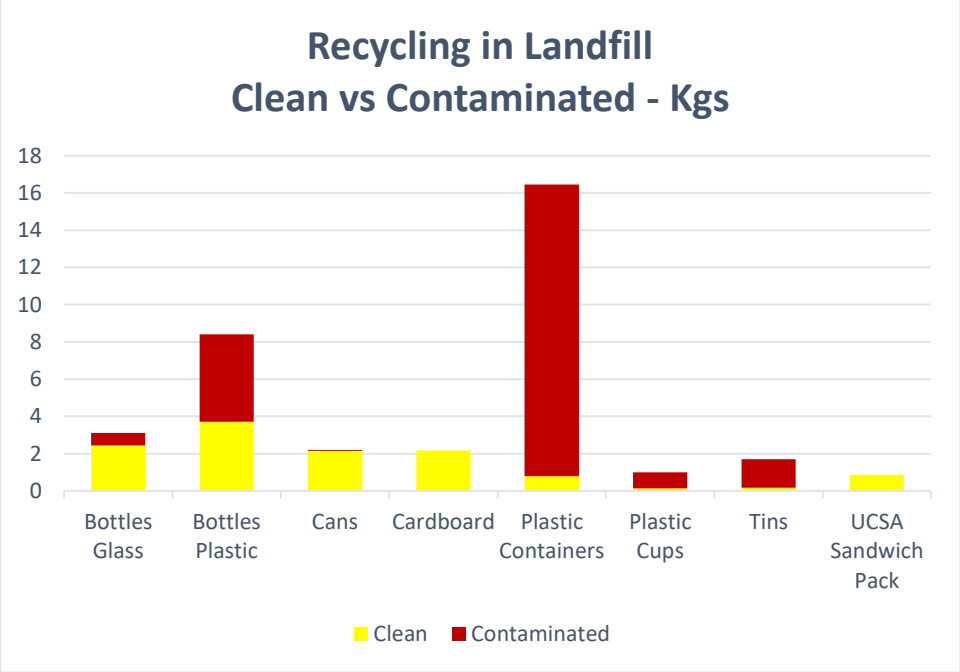

Figure 15 Recyclable items that were in the Landfill bins shown by clean and contaminated

In the case of the tins, plastic containers and plastic bottles it is better that dirty recyclables go to the landfill, but the cans, glass bottles and cardboard could be easily diverted.

7.4 Organics in Landfill

Organics accounts for 31% of the landfill stream and the following graph shows the breakdown by area, showing that the UCSA kitchens account for the highest amount of organics in landfill (43kgs), although that figure is much improved on the 127kg that was recorded from the same area in the 2014 audit.

Table 2 Breakdown of organics in landfill by area.

Waste Stream	**Undercroft**	UCSA PK	**K. Popper/ C Block**	**Total**
Organics	28.1	43	37.6	108.7

The organics that found its way into the landfill bins used in the Undercroft and Karl Popper building was leftover meals usually tucked inside the packaging, along with the cutlery and serviettes, showing that people like making tidy packets of their waste, which they then prefer to bin as one item rather than sorting.

However, the food in the landfill bins from the UCSA PK was in bulk, and could have easily been put in a dedicated organics bin, saving landfill fees. One explanation is that the kitchen staff do not know that Living Earth, where Canterbury's green bins go, can take meat, dairy and fish products (see section 10.2).

Figure 16 L: Veggie scraps from UCSA PK in landfill; R Untouched meal in landfill

8. ORGANICS

As the largest stream by weight the organics stream (267.5kg) continues to be problematic, both in volume and which bin it is going to. Due to time constraints and the difficulty and risk of auditing organics we did not sort it, but the total weight distribution for each area was recorded as below.

Table 3 Breakdown of organics distribution by area

Waste Stream	Undercroft	UCSA PK	K. Popper/ C Block	Total
Organics in Organics	75.8	56.2	13.4	145.4
Organics in Landfill	28.1	43	37.6	108.7
Organics in Recycling	7.1	0	4.3	11.4
Organics in Paper	2.0	n/a	0	2.0
Total All	**113**	**99.2**	**55.3**	**267.5**

Although it would be expected that the UCSA PK would have the largest amount of organics, the bags from the Undercroft were heavier due to greater non-organic contamination as shown by the following pictures taken of an uncontaminated organics bag from the UCSA PK, and an organics bag from the Undercroft contaminated landfill and bio-cups which are now being collected in a separate blue stream. These cups are not approved by Living Earth to go with the general organics collection and are being composted separately in an initiative by the UC Sustainability Office.

Figure 17 L: Clean Organics taken from UCSA PK, R:Organics contaminated with biocups from Undercroft

9. PAPER

There were very few paper bags put aside for us to audit, so the sample is not as large as the other streams but a total of 23.3kg was audited as part of the paper stream, with a further 7.7kg and 2.7kg being audited in the landfill and GR streams respectively.

9.1 Breakdown of Paper by Stream

The paper was sorted into the following categories: paper, cardboard, non-recyclable paper, landfill. There was only one item of comingled recycling in the paper so this category is not recorded in the statistics below as it was too light to count. The following chart shows the percentage of the above categories, and that 76% of the paper stream was either clean paper or cardboard. Although relatively low, the landfill and organics contamination in the paper is of concern because the cleaner the paper is the greater the discount for disposal. However, the paper skips were contamination free so Cleaning Services staff are clearly sorting this waste stream effectively.

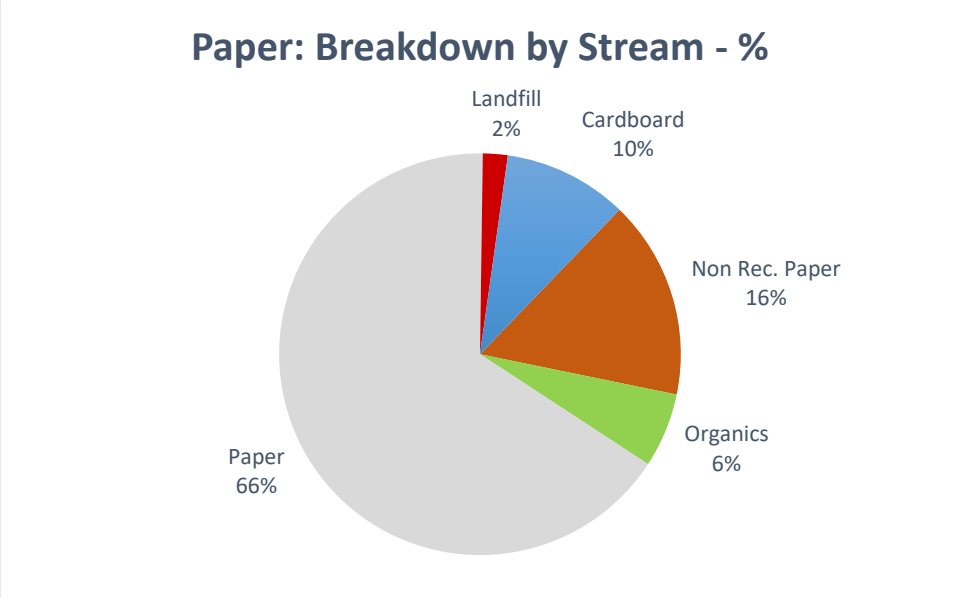

Figure 18 Paper breakdown by Stream - Percentage

9.2 Landfill Contamination in Paper

A total of 5.68kg of landfill contamination was in the paper, but 5kg of this was non-recyclable paper as categorised above. Of the smaller items the breakdown was as follows:

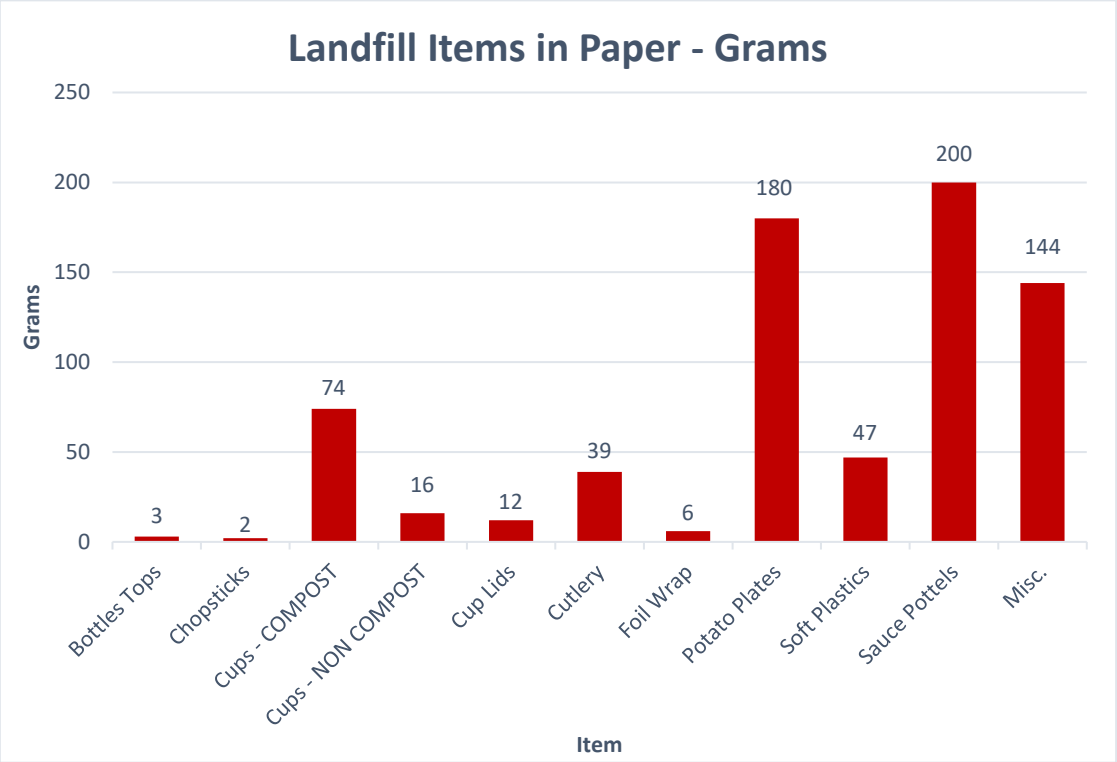

Figure 19 Breakdown of Landfill in the Paper - Grams

10. AREAS

Each area was different in the makeup of the waste. The following chart shows the breakdown of waste by area after classification.

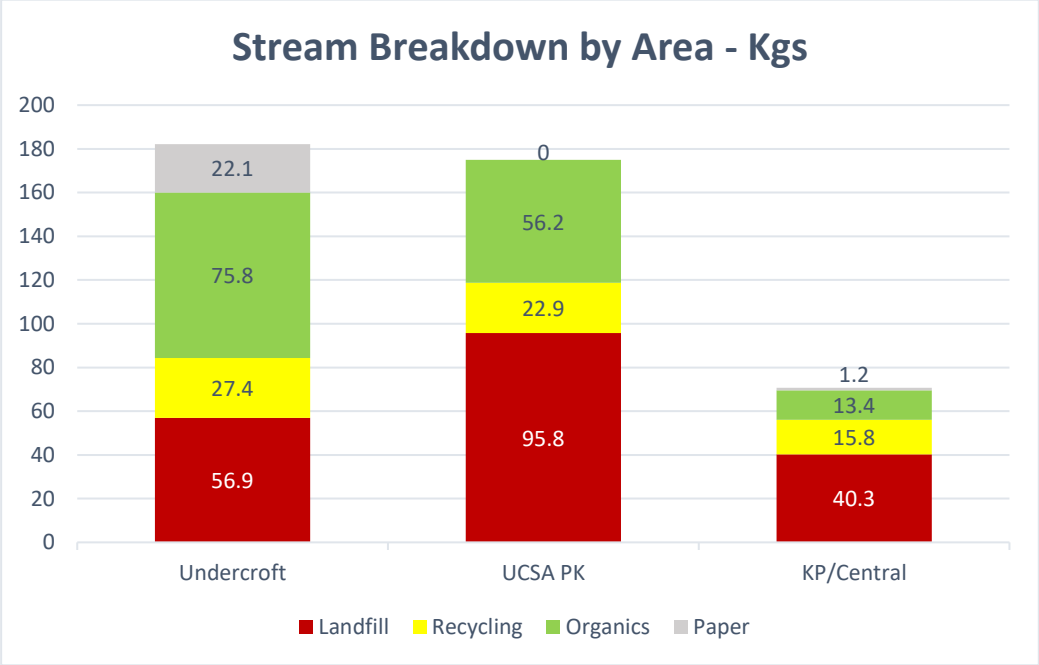

Figure 20 Breakdown of streams by area

10.1 The Undercroft

The Undercroft bins were almost exclusively made up of waste comprised of food and food and beverage packaging sold on the site. Food across all the streams from the Undercroft totalled 110kg, followed by paper (24kg), plastic and glass bottles (18kg), cardboard food packaging (15kg), potato plates (5kg) and total all sauce containers (6kg). That there are such high levels of food wasted after purchase suggests that the portions may be too high, or of low quality (there was a lot of fried rice thrown out).

Figure 21 Food disposed of inside multiple layers of packaging at the Undercroft

Most of the waste was disposed of in packages, often in several layers where food and cutlery was inside food boxes, which were inside bags etc. (see Fig. 20). As such, the message that waste needs to be sorted at the bins is not getting through as students tidy their waste at the table and then put it all into one bin.

10.2 UCSA Production Kitchen

Figure 22 Food waste still in packaging in the Organics bin

The UCSA PK did better at putting the right things in the bins, apart from the organics stream where 56.2kg of food waste found its way to the organics stream, but 43kg was put in landfill, increasing the landfill weights considerably for this area. Some of this may be due to kitchen staff not being aware that in Canterbury raw meat, fish and dairy can go in the green bins. However, as the cooked food also present in the landfill suggests, it may also be down to an unwillingness to separate food waste. There was also a lot of food waste inside containers such as sauce bottles and cooking oil bags as shown in Fig 22 and 23**.** That some of it was raw chicken etc. makes it a H&S risk for Cleaning Services staff collecting bags. Organics bins have clear liner bags so that any risks can be seen, and they are usually stronger. Staff know to handle them carefully whereas landfill bags could be at risk of leaking or ripping, especially when the heavier organics tends to sink to the bottom.

Figure 23 Oil inside plastic packaging

More positively, the message about rinsing recycling has had an effect with a total of 22.8kg of recycling collected in the UCSA PK, 21kg of which was clean. There was only 1.5kg of landfill items in the recycling including unrecyclable paper, cardboard food containers and bottle tops. There was also 7.2kg of recycling in the landfill, but most of this was dirty so had been put in the right place.

With the most amount of landfill of any of the three areas however, the UCSA PK bins revealed some highly wasteful practices in the kitchen, many of which will be justified as being for H&S reasons; however, there is certainly room for improvement as the figures below show.

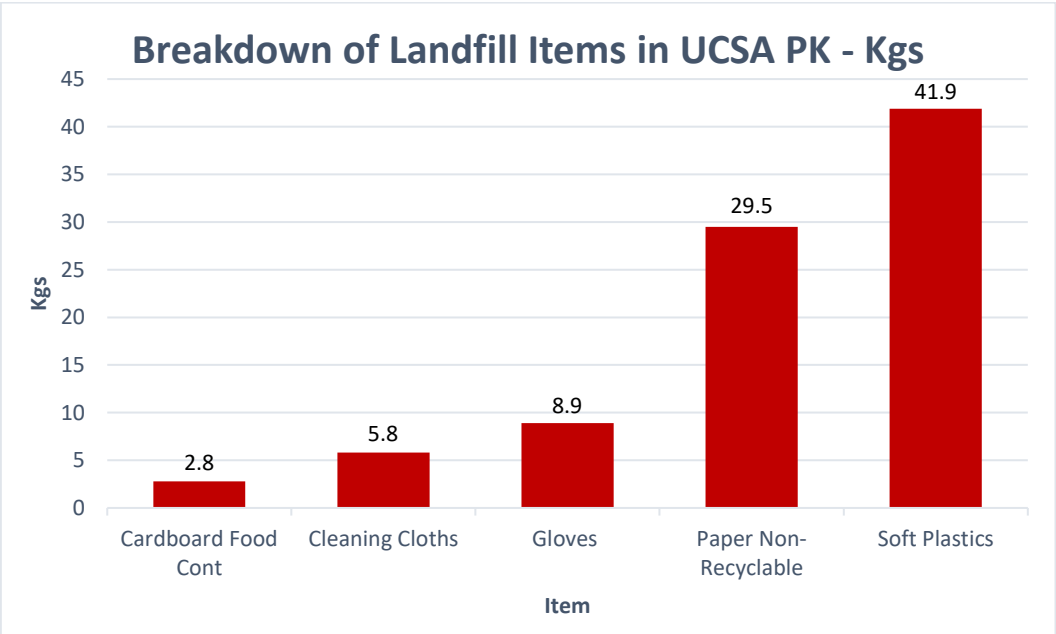

Figure 24 Breakdown of landfill items in UCSA Production Kitchen landfill bins

Some observations about these figures include:

- The high amount of plastics is all the packaging for bread, frozen veggies, and packets from the processed food being sold in the cafés.
- For such a lightweight item as gloves, 8.9kg collected over a week seems high, and many of the gloves looked to be fairly clean. Although this is a H&S necessity, perhaps staff could be encouraged to reduce glove waste.
- Many of the cleaning cloths thrown out were also quite clean so again, staff may be being overly cautious due to H&S reasons, but this practice will be costing both the UCSA in procurement costs and the UC in disposal fees.

Figure 25 L: Two day's worth of gloves in a 10l bucket, R: Cleaning Cloths found in the bins

10.3 C-Block and Karl Popper Building

As expected, there was more office waste from this area, but some of the data will be skewed due to the collection method of bags. The cleaners are instructed to remove the smaller bags from the indoor bins, tie them off and place them in the larger bags from the outdoor bins. Unless the recycling, paper and organics bags are visibly contaminated the small bags should be placed in the appropriate waste stream. However, the large landfill bags from this area were consistently filled with both recycling and organics bags (**see Fig.),** most of which were clean enough to go to the appropriate stream, indicating that at least one cleaner in this building is simply putting all waste in landfill. Where the smaller bags were tied off we were able to remove them and sort as part of the appropriate stream, so that this mistake would not skew our data on bin user behaviour, but a number of bags were open and had been distributed through the landfill, making it difficult to ascertain which bin it had originally come from.

Figure 26 Rubbish bags from offices found in the landfill bins

As such, the recycling was more evenly distributed between the recycling and landfill streams with 15.8kg in recycling (10.3kg of which was clean), and 13.7kg in landfill (6.1kg of which was clean). However, 6.7kg of the waste put into the recycling stream was landfill, 4.4kg of which was unrecyclable paper, followed by bottle tops (0.4kg) and soft plastics (0.3kg) indicating that greater recycling education is required.

Paper was collected separately on one of the audit days in this area so we were able to get some data showing that this stream is also being abused, with only 1.2kg of clean/recyclable paper collected compared to 2.3kg of dirty/non-recyclable paper collected. By contrast there was a total of 5.7kg paper in landfill for the week, showing that people prefer putting it all in one bin.

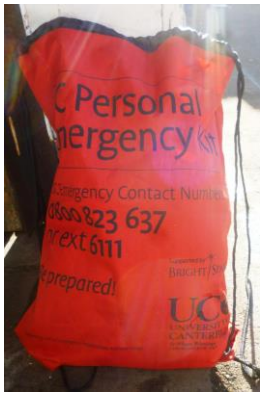

Figure 27 Earthquake emergency kit found in one of the bins

The landfill in this area was mostly put in the landfill bins (40.3kg), with 2.3kg going to paper, and 6.7kg in recycling. The biggest categories for landfill in this area were dirty/non-recyclable paper (12.7kg), soft plastics (3.9kg) and miscellaneous (8.4kg). Much of the weight from this final category came one day's auditing when someone had cleaned out their office and disposed of their desk stationery (incl. staplers etc.) into the landfill bin. This also included their earthquake emergency kit, indicating that it may be worth sending departing staff emails about leaving any reusables in the office for the next occupant, or at least sending them to the warehouse for reuse.

11.CIGARETTE BUTTS

There were very few cigarette butts in the bins, indicating that in some areas the Smoke-Free campus initiative is working. However, there were a lot of cigarette butts in the gutters surrounding the campus, and they were also present in large numbers in the UC car parking areas. The photo of butts in the gutter at right (Fig. 28) indicates that smokers are even smoking in the carpark in front of the Security building.


Figure 28 An example of cigarette butts found on campus

The environmental effects of cigarette butts getting into the storm water drains – and worse, directly into the rivers and streams running through the UC grounds – have been widely covered. Making an area Smoke-Free does not prevent this; in fact, it can make it worse as there is no recourse to ashtrays. Regardless of the rules, smokers are addicted and will smoke and when they are deprived of ashtrays they often flick them into the nearest receptacle be it a gutter, garden, storm-water drains, or an award winning stream such as the Okeover.

The positive effects of being a Smoke-Free campus are manifest, but unless there is proper education and policing of smokers on campus, this will continue to be an unexpected outcome of the endeavour. The public's perception of the success of the program may also be negatively influenced by the visible presence of cigarette butts on campus.

12.RECOMMENDATIONS

12.1 Recommendations for improving the recycling system

The UC's commitment to a 5-stream recycling system makes it a leader in recycling but there is still a lot of education required to ensure that the recycling is clean enough to recycle, as per the following recommendations:

- Choose the items that create the most contamination such as food and dirty paper and use the UC and UCSA's marketing and social media outlets, including the screens in foyers to circulate short videos and memes teaching people which bin these items go to.
- Ongoing staff training in production kitchens and cafés to ensure they understand how to sort their waste.
- Offer incentives to sustainability groups to stand in front of recycling stations at busy lunchtimes during Orientation events and the first week of semester.
- Include regular recycling tips in *Canta* and other UC print and online publications

12.2 Recommendations for waste prevention

With so much unnecessary waste being sold on campus there is a terrific opportunity to seriously reduce waste and associated disposal and staff costs by adopting a waste prevention policy whereby waste is not created in the first place. Some suggestions are:

- Work with CCC to implement a Love Food Hate Waste initiative at the UC, including stalls for Orientation and events etc.
- Reinstall dishwashing facilities in cafés.
- Replace all single-serve sauces and condiments with bulk bottles on counters with purchasers able to choose whether to use it or not.

Figure 29 L: Goodie bags from events, R: Single use tea bag packaging

- Stop giving out goodie bags at Orientation and events. Fig. 29 shows a number of goodie bags thrown into the waste at the end of the event, many of them including all the giveaways.
- If you must give out goodie bags or have stall giveaways, consider getting sponsorship for items such as reusable cups, takeaway containers and cutlery, that will reduce waste and costs rather than add to them.
- Encourage cafés to offer discounts to customers bringing reusable cups, takeaway containers, and cutlery

- Whilst it is commendable that the UC has gone Fair Trade for tea etc. staff were concerned over the unnecessary single use packaging (see Fig 29). Encourage Scarborough Fair to provide tea bags with no tags or wraps.
- Although attempts have been made to ban polystyrene on campus, that it is still being used for events was evidenced by a large number of cups as shown in Fig 30. It is one of the worst types of waste in use and breaks down into easily windswept pieces if littered. Suggest a campus-wide ban including removal from all procurement providers, and fines for departments found using them.
- There were also a large number of laminated posters discarded Suggest only allowing laminated posters on campus if they are for permanent display.

Figure 30 Polystyrene cups used on campus

13.CONCLUSION

Whilst parts of the UC's recycling system are working well, there is still education required to teach bin users how to sort their waste. Along with the increased numbers of students and workers on campus, there has been a corresponding increase in the volumes and types of waste, and there is scope for a dedicated waste prevention programme if the UC is to stay in line with other tertiary institutions that are working hard to reduce their waste output. A significant reduction in waste output and costs can also have a positive PR effect, as shown by the media interest in campus-led waste prevention as evidenced by the café at the Otago Polytechnic that banned coffee cups (https://www.stuff.co.nz/business/better-business/94412380/dunedin-cafe-keeps-35000-disposable-coffee-cups-from-landfill) . As such, I recommend investing further into waste education and prevention programmes in order to gain long term benefits.