Corporate Waste Recycling Improvement in the Croydon Council

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May 1, 2015
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Corporate Waste Recycling Improvement
In the Croydon Council

An Interactive Qualifying Project
submitted to the Faculty of
WORCESTER POLYTECHNIC INSTITUTE
in partial fulfilment of the requirements for the
degree of Bachelor of Science

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Date:
May 1 2015

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Abstract

The goal of this project was to evaluate the status of current recycling practices within the Croydon Council offices and provide recommendations for improved strategies. We assessed the perspectives and practices of Council employees through a staff survey, in-person interviews, and onsite observations. We assessed recycling in other boroughs to identify best practices. Based on our findings, we recommended the Council explore ways to enhance existing communication about recycling, improve labeling in recycling areas, and reinvigorate its recycling champion network. We also recommend the Council examine further the use of compactors and color-coded bags for different waste streams.

Acknowledgements

Our team would like to thank a few key individuals for their help and support for the duration of our project. Our project would not have been as successful without the guidance and support from the following people.

First, we would like to thank our project sponsors Bob Fiddik and Malcolm Bell. Bob is the Sustainability Development and Energy Team Leader for the Croydon Council and Malcolm Bell is the Energy Project Support Officer. Malcolm set up initial interviews and provided us with contacts that were beneficial to our project research.

Secondly, we would to thank the staff of the Croydon Council who was willing to meet with us and provide us with information critical to our research. Without their cooperation, we would not have received the amount of information we obtained. We appreciate the staff for taking time to complete our survey and would not have had as accurate results without their participation.

Additionally, we would like to thank the members of the other boroughs and the London Fire Brigade for meeting with us. They all provided information that was essential to our findings and recommendations.

Finally, we would like to thank our advisors, Dominic Golding and Patricia Stapleton. Throughout the entire semester, they helped us develop our project from concept to completion. Their help and guidance in all aspects of our project has been invaluable. Without their constant revisions, immense amount of work, and unyielding support, we would not have such a rewarding final product for which we are proud.

Executive Summary

In recent decades, the United Kingdom has felt the growing pressure to recycle. As the population increases, land, energy, and resources are depleted while the volume of waste produced continues to rise. The United Kingdom recognizes the need to reduce the amount of waste being sent to landfills and incinerators and has increased materials recycling rates faster than any other country in Europe between 2000 and 2010 (Vaughan 2013). Despite efforts to reduce material consumption and to promote greater reuse and recycling of materials, there is growing concern about future capacity, safety, and cost of landfills and incinerators. The United Kingdom continues to make efforts to improve waste management programs at the national, regional, and local levels.

The Croydon Council is responsible for promoting and enforcing recycling policies within the borough; however, our project team believes the Council's internal recycling program could be further optimized. The goal of this project was to evaluate Croydon Council's current recycling practices and provide recommendations for improved strategies. To accomplish this goal, the team (1) identified the best practices for effective recycling in offices; (2) clarified plans, policies, and guideline's for Croydon's current in-house recycling program; (3) conducted a baseline assessment of Croydon's in-house recycling program; (4) evaluated employee opinions about Croydon's in-house recycling policies and practices; and (5) developed a set of recommendations and strategies for improvement based on the data from the objectives.

Methods

In order to identify the best practices for effective recycling programs, our team interviewed experts on in-house or office recycling programs. The purpose of these interviews was to identify the attributes that make office recycling programs more effective and obtain additional ideas on how to improve Croydon's policies and guidelines. Our team contacted all 32 boroughs in London, but focused in particular on boroughs known to have state-of-the-art recycling approaches. By interviewing multiple boroughs with successful recycling programs, our team was able to determine beneficial recommendations specifically for the Croydon Council.

Upon arrival in the Council, our team interviewed key Croydon staff members and reviewed internal information inaccessible to us while in the United States in order to determine

current practices, policies, and guidelines. From the interviews, we received information about current in-house recycling programs from Croydon Council employees. This information determined the effectiveness of the recycling program and helped assess what methods are followed and/or ignored among employees.

In order to establish a set of recommendations for effective recycling in the Croydon Council, our team analyzed the effectiveness of the current recycling program. We specifically analyzed the recycling practices within the Bernard Weatherill House (BWH) and the Town Hall/ Clock Tower. For BWH our team shadowed Interserve staff and reviewed the preliminary contamination research. Our team analyzed the Town Hall/Clock Tower through interviews with employees and an in-depth tour of the site.

To gain a better understanding of the current council recycling situation, we surveyed all levels of council employees regarding their opinions and habits relating to the Croydon Council's current and future plans. We strategically interviewed employees who are involved in recycling and they provided us with further insight into the Council's recycling practices.

As the final step of our project, we developed a proposal outlining recommendations for improvements to the recycling program based on our research findings. We compared and contrasted the practices of multiple boroughs in order to determine what suggestions were most beneficial to the Croydon Council.

Findings

After we conducted our research, our team presented our findings in four parts: "Case Studies of Recycling Practices in London", "Current Recycling Practices", "Evaluating Employee Knowledge", and "Evaluating Employee Opinions". These findings helped us gain a better understanding of effective recycling programs, obtain insight into the current recycling program within the Croydon Council, and determine the most beneficial recommendations for the internal recycling of the Council.

Based on our interviews and site visits, we identified a set of strategies that are essential to an effective office recycling program these include effective education, communication, and labeling, the promotion of a champion network, and the use of waste audits to check compliance and provide feedback to employees. Our team determined that in order to have a successful recycling program, there needs to be a balance among all of these categories. Croydon has

implemented some of these strategies in the past but has been unsuccessful in placing a strong, balanced emphasis on every strategy. Our team believes that the recycling rates within the Croydon Council will increase if improvements are made to all of the categories previously listed.

The current recycling practices for the Croydon Council were analyzed by looking at the major buildings run by the Council. Each building serves a different purpose and therefore produces a different amount and variety of waste. There are no mandatory recycling policies for the employees of the Croydon Council and therefore it is more difficult to encourage employees to recycle. Our team focused on the Bernard Weatherill House and the Town Hall/Clock Tower to gain further understanding of recycling within various buildings. As a result of this analysis, we found that bin accessibility, communication, and bin labeling are extremely important to a successful recycling program.

Our team also evaluated the employee knowledge in regards to recycling through interviews and a Council-wide survey. The results clearly showed there is a large lack of recycling knowledge within the Croydon Council and that employees have the desire to learn more.

The opinions of the employees were evaluated further through interviews with Council staff, recycling champions, and through evaluating the open response questions from the survey. Through the analysis and comparison of these opinions, our team determined there is a strong need for communication and recycling participation within the Croydon Council.

Conclusions and Recommendations

Based on our findings, we divided our recommendations into four major sections: Accessibility, Labeling, Education, and Communication. Within those sections, we categorized the recommendations further into low effort solutions and greater effort solutions. The amount of effort necessary for each recommendation was rated in terms of the cost, time, management, maintenance, and potential risk analysis associated with each task. A summary of our recommendations can be seen below.

	Recommendation	Pros	Cons
Low effort solutions	**Tipping Container**	- Reduce contamination - Cheap	- Health & Safety concerns (spilling/hot liquid, etc.) - Needs to be emptied
	Bins for Octavo	- Easy fix (If extra bins are available)	- Costs money (If bins are not available)
	Improved Labeling	- Less confusion about bins - Reduce contamination	- Costs money to be designed and printed
	Colored Waste Bags	- Less contamination due to incorrect bag placement	- May be more expensive than clear bags
	Education among Council Staff	- Almost priceless - Reduce contamination - Potentially save money	- Requires organization
	(Non)Recyclable-of-the-week	- Cheap - Simple to maintain	- Need a leader
	Communication about improvements	- Cheap - Constant reminders - Increase awareness	- Requires organization
Greater Effort Solutions	**Bins for Town Hall/ Clock Tower**	- Increase accessibility - Reduce contamination - Reduce landfill waste	- Space constraints - Costs money - Health & Safety risks
	Improved Data Collection System	- Provide figures to employees - Determine baseline - Aware of current rates and improvements	- Requires organization - Continuous maintenance - Need to inform all staff
	Inter-office competition	- Competitive incentive - Increase recycling rates - Positive reinforcement	- Difficult to divide floors - Requires organization
	Recycling Champions	- Cheap - Improves communication	- Requires organization - Need enthusiastic leader - Large time investment
	Compactor	- More recyclables/waste for the same price - Less collections needed	- Expensive - Requires maintenance - Training

These recommendations were developed based on the findings our team collected through interviews, site visits, and survey analysis. With these recommendations taken into consideration, our team is confident that the Croydon Council will be successful in increasing the internal recycling rates.

Authorship

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Acknowledgements	All	-	All	-
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1. Introduction

In recent decades, the United Kingdom has felt the growing pressure to recycle. As the population increases, land, energy, and resources are depleted while the volume of waste produced continues to rise. The United Kingdom recognizes the need to reduce the amount of waste being sent to landfills and incinerators and has increased materials recycling rates faster than any other country in Europe between 2000 and 2010 (Vaughan 2013). Despite efforts to reduce material consumption and to promote greater reuse and recycling of materials, there is growing concern about future capacity, safety, and cost of landfills and incinerators. The United Kingdom continues to make efforts to improve waste management programs at the national, regional, and local levels.

The Croydon Council is responsible for enforcing recycling habits within the London Borough of Croydon. In 2013, the Council enacted policies to encourage recycling amongst the Borough's residents receiving green and blue recycling box service (Croydon Advertiser, 2014). Recently, however, it was discovered that the Council's own internal recycling policies have been lacking. The local press published a story revealing recyclable materials being thrown into landfill waste containers directly outside the main Council offices. In response to this incident, the Council has collected data to evaluate the current state of recycling within the office as well as employee perception of recycling and potential policies. Currently, the Council does not have compulsory recycling policies specific to the building, making it more difficult to monitor and regulate recycling programs.

This project analyzed current recycling habits within the Croydon Council and recommend upgraded programs designed to improve recycling participation in the office. By distributing a survey to the entirety of the Council's employees, conducting interviews with strategically identified staff members and conducting site visits and phone interviews with other boroughs, the project explored ways to increase awareness of recycling and help promote innovative practices. The survey and interview results determined areas of recycling weakness within the Council as well as areas where recycling is currently at a satisfactory level. We also explored potential incentive programs (e.g. office champions and inter-office competitions) and decide which to recommend to the Council. Using the information that we gather we will aid in establishing guidelines intended to improve recycling practices within the Croydon Council. By

improving recycling habits of employees, the Croydon Council will be better able to develop and enforce recycling in the rest of the borough by leading through example.

2. Background

The Croydon Council is responsible for promoting recycling policies within the borough; however, our project team believes the Council's in-house recycling program could be further optimized. To support this claim, we looked at three topics: waste management in the United Kingdom, Croydon's approach to waste management, and lessons learned about promoting recycling. By the end of the chapter, readers will understand the extensive impact of recycling practices, the destination and associated costs of waste in Croydon, the benefits of incentive programs, and effective recycling programs in other locations.

2.1 Waste Management in the UK

In 2009, the European Union issued a waste directive aimed in part at improved recycling practices. Chapter 2, article 11, subsection 1 the directive declares "by 2015 separate collection shall be set up for at least the following: paper, metal, plastic and glass," (European Union, 2008). Thus, organizations must make provision for the separation and collection of these items as a minimum of their recycling practices.

The United Kingdom enacted a waste hierarchy program in 2011 to encourage individuals and organizations to prioritize prevention, reuse, and recycling over other waste disposal methods. Disposal is at the bottom of the inverted pyramid as seen in Figure 1 because that is the least desired waste destination. Preventing waste is at the top of the inverted pyramid because preventing waste has the least negative effect on the environment (Department for Environment Food & Rural Affairs, 2011). The waste hierarchy program is designed so landfill waste is the last resort of disposal and suggests alternatives disposal or reuse methods for some wastes. For example, instead of disposing of food waste into a bin destined for a landfill, people should consider composting the waste if it is possible (DEFRA, 2011).

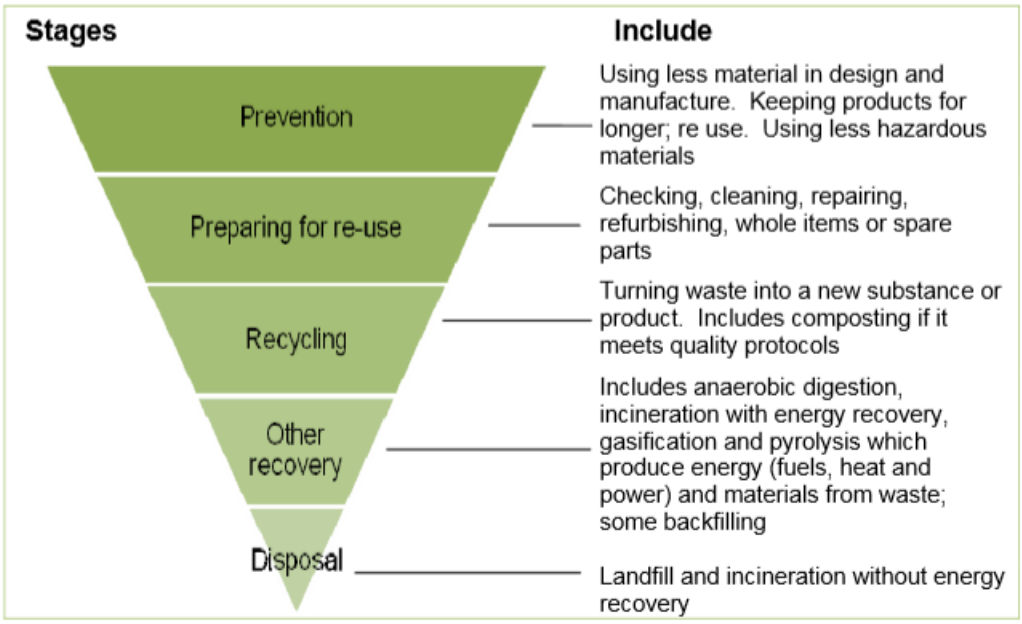

Figure 1: United Kingdom Waste Hierarchy (DEFRA, 2011)

Although prevention is the ultimate goal, recycling remains a prominent part of the waste hierarchy. Recycling, in simple terms, is the process of converting waste into a reusable material. However, recycling is only one part of the waste management solution; reducing the amount of waste produced as well as reusing products in other ways will help reduce the amount of waste in landfills. In the Finance Act of 1996, the United Kingdom introduced a Landfill Tax. The tax was put into place to encourage organizations to reduce the amount of waste added to the landfills and dispose of their waste through other methods, such as recycling or reusing materials (Maccioni 2013). As a result of the tax, the amount of material sent to landfills has decreased in England from 79% in 2000-2001 to approximately 55% at the end of 2007 (Waste and Recycling n.d.). Public opposition to landfills also contributed to the reduction of waste build-up. In 2002, a survey was conducted by MORI Social Research Institute to evaluate public attitudes towards waste and recycling in the UK. The survey results showed that 75% of respondents believed landfills had a negative impact on the environment (MORI 2002). Despite efforts to reduce waste, however, landfills still remain an important source of disposal in the UK.

Incinerators have reduced the amount of waste going to landfills but incineration creates other problems including health and environmental impacts. Incineration creates economic pressure because incinerators are extremely expensive to build and require long-term contracts. The contracts demand a certain volume of waste be provided to the incinerators for a period of

time, typically 20 to 30 years (Seltenrich 2013). The need for a specific volume of waste to meet contracts reduces the incentive to reuse and recycle and creates additional waste in the form of ash. Due to the continuous demand for waste generation, incinerators cost cities more and provide fewer jobs while hindering local recycling-based businesses (Zafar 2008). In sum, incineration does not provide a viable solution to landfills and "public opposition to incineration is growing worldwide" (Incineration 2015).

Opposition to landfills and incinerators has continued to increase because both methods of waste disposal are perceived to pose a substantial threat to the human health and/or the environment. Although landfills are designed to isolate trash from the surrounding areas, there are continuing problems with groundwater contamination and greenhouse gas emissions (Robbins 2007). In recent years, landfills have seen a decrease in organic waste and an increase in "bulky and increasingly non-biodegradable" waste (Robbins 2007). Incineration reduces the volume of waste quickly and in large quantities, but the process produces ash and emissions that are harmful to the environment. Toxins such as sulfur dioxide and hydrochloric acid are released into the atmosphere and any remaining ash is disposed of at designated hazardous landfill sites (UKWIN n.d.).

In many situations, recycling helps create jobs, reduces the need for additional landfills and incinerators, saves energy, supplies valuable materials to industry, and contributes positively to the economy in other ways. In the United Kingdom, efforts to promote recycling have been relatively successful and rates of recycling in the UK rose faster between 2000 and 2010 than in any other country in Europe (Vaughan 2013). In just ten years, the UK was able to increase recycling rates for all municipal waste by 27% and household recycling rates rose 32% (Vaughan 2013).

Recycling not only helps reduce waste, it also saves energy. Energy is used in the four stages of a product's life cycle: extraction of raw materials, manufacturing of materials into products, product use by the consumers, and product disposal. Recycling helps reduce the amount of energy used during the entire cycle. As shown in Figure 2 and according to the United States Environmental Protection Agency (EPA), recycling a single aluminum can uses only 5% of the energy needed to extract the aluminum that would be needed for a new can (Feldman n.d.).

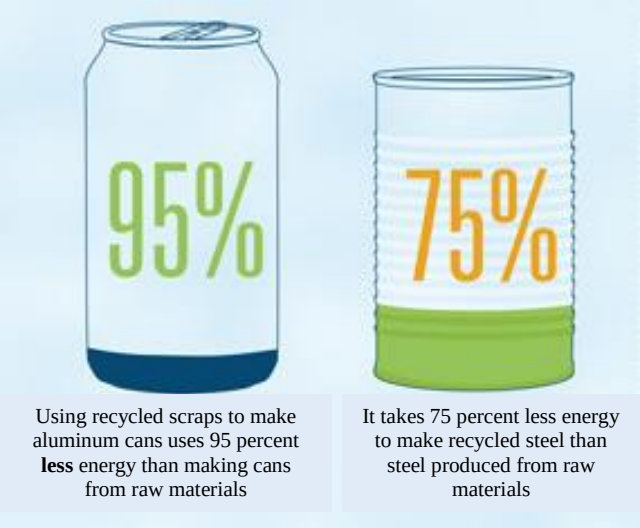

Figure 2: Recycling Saves Energy (Jin 2014)

The types of materials that are or can be recycled vary from place to place. Typically, many types of paper products can be recycled, although, the paper recycling process requires large volumes of clean, uncontaminated, and dry paper (Benefits 2015). Forms of metal that can be recycled include steel, glass, aluminum, and foil. Plastic is also a commonly recycled item, and the variety of plastics suitable for recycling continues to grow (Benefits 2015). In the United Kingdom, the national government does not specify recycling targets. Instead, local authorities are responsible for implementing arrangements which are developed for their area based on local costs, targets, and logistics (Recycling Guide 2015). Several local authorities in the UK use the "dual bag method" which provides households with two bags: a red one for plastics and metal, and a black one for paper, card, and textiles (Recycling Guide 2015). The partial separation makes the process more efficient for the council and less burdensome for households. In addition to at-home recycling bags, there are recycling "banks" at many locations across the United Kingdom. Banks of bins are located on the streets and in supermarkets to make recycling on-the-go more convenient and to reduce the amount of recyclables thrown in the garbage. Because recycling policies and schemes vary across the UK, individual councils typically provide instructions for residents on the local council website.

2.2 Croydon's Approach to Waste Management

The London Borough of Croydon is part of the South London Waste Partnership, along with the Boroughs of Sutton, Merton, and Kingston. These boroughs work together to manage recycling and landfills. Recyclables and waste items from Croydon are managed differently than in many other boroughs. For example, dry recyclables, such as cans, paper, cardboard, glass, plastic bottles, and textiles, are sorted at the curbside. The dry recycling is then "managed directly by their collection contractor and does not go through the contracts awarded by the Partnership" (What happens to your recycling and composting, 2015). In Merton and Sutton however, dry recyclables are sent directly to a Materials Recovery Facility (MRF) in Kent, where they are sorted and stacked for collection by other companies who convert the recyclables into resource materials or products (Industrial recycling and composting techniques, 2015).

Waste collected in Croydon is divided up into different types, depending on the amount of resources and uses that each can provide. Strictly food waste, consisting of mostly raw and cooked foods, is collected and taken to a composting facility in Mitcham, owned by the composting distribution company, Vertal (Vertal Urban, 2015). This compost can later be used for landscaping and gardening in the parks and gardens of London. Another alternative disposal method for food waste is the collection of cooking oils. In 2007, the Croydon Council partnered with Proper Oils to establish a cooking oil collection service. Proper Oils takes unwanted cooking oil and converts it into usable and marketable biodiesel (Croydon Council to collect waste cooking oil, 2009).

Garden waste, such as dead leaves and branches, is transported to an "in-vessel" compost plant in Beddington Lane, Sutton. There, the waste is blended up into mulch, and stored in "large sheds (vessels) where the moisture content, air flow and temperature can be controlled and the optimum conditions for composting are created" (Industrial recycling composting techniques, 2015). The In-Vessel Compost Plant is owned by Viridor, who strictly handle garden waste and signed a 25-year contract with the South London Waste Partnership in December of 2011. Viridor has also been allowed to construct "…an energy recovery facility at ViridoraCO's landfill recycling site in Beddington… [This facility] will be used to treat about 200,000 tonnes of waste per year from the London boroughs of Croydon, Kingston, Merton and Sutton" (Viridor and Veolia go corporate on UK waste contracts, 2012). Viridor plans to begin operations at the facility in 2017 (Reece, 2013).

"White goods" form an additional waste stream that poses disposal issues. These unwanted products, comprising used computers, televisions, kitchen appliances, and other small electronics, can be given to retailers in the "bring back schemes" (White goods collection, 2015). These schemes allow retailers to sell the components in markets, where consumers can buy and resell the products. Another alternative is WEEE recycling (recycling waste electrical and electronic equipment). With WEEE recycling, white goods are taken apart, with the salvaged components being sent "to various industries [in Greater London] to be reprocessed or reused directly" (Business Waste, 2015).

The Croydon Council has invested £320,000 in an improvement program that included an increase in the number of recyclable materials collected, improved labels, and layout. To continue progress, the Council merged with three other boroughs to form the South London Waste Partnership (SLWP) and develop the "Joint Municipal Waste Management Strategy" of 2010 (Joint Municipal Waste Strategy Management, 2010). The waste management strategy emphasizes the challenge of developing an effective and efficient recycling program as well as the cost of getting it wrong, both financially and environmentally.

The overall goal of the new strategy is to reduce the impact municipal solid waste (MSW) has on the environment by effectively diverting waste from landfill. Figure 3, below, shows the actual MSW increase for the partnership for financial years 2006/07 to 2009/10 as well as future modelled increases (JMWSM, 2010).

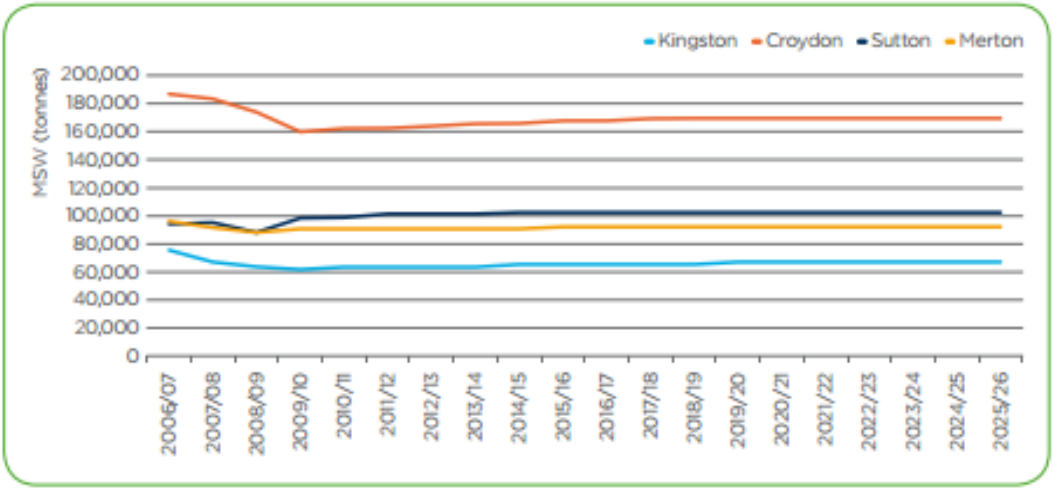

Figure 3: MSW increases modelled up to the year 2025/26

As shown in Figure 3, Croydon has the greatest quantity of municipal waste compared to the other three boroughs of the South London Waste Partnership. It is important to note,

however, that from 2006-2010 Croydon reduced the amount of waste more drastically than any of the other three boroughs. Additionally, Croydon has the largest population of the four boroughs by over 165,000 residents and therefore is expected to have a larger amount of waste.

Based on internal documents from the Croydon Council, the Council currently spends approximately £40,000 per business day on landfill costs, totaling over £9 million annually. According to the current waste management contract, it costs considerably less to recycle than it does to dispose of landfill waste. The waste management contract is an outline of the terms and conditions agreed upon by the Croydon Council and the waste contractor, Veolia. The contract is determined based on market price data to develop an effective financial plan (Andrew, 2013). The constant changes in market prices make it exceedingly difficult to negotiate a contract that meets the needs of the borough and remains sufficiently profitable for the contractor. Determining long-term waste negotiations with the contractor and developing local demand for recycled materials ensures the overall contract is beneficial to the borough (Andrews, 2013).

One section of the contract describes how the Council will be charged for waste collection. In the Croydon Council, the large waste bins are collected by Veolia on a schedule: the landfill waste is collected daily, recycling is collected every Monday, Wednesday, and Friday, and food waste is collected every Wednesday and Friday. The Council is charged for the waste by volume (i.e. charged a flat rate per bin emptied). Unfortunately, even if the bin is not totally full, the Council gets charged the same amount for having the bin emptied. Other boroughs have similar contracts to Croydon and have found compactors to be a money saving technique.

The London Borough of Croydon is working on cutting back the amount of recyclable materials that make their way into the borough's landfills. The borough is using two financial drivers to push this initiative forward: a Landfill Tax and a Landfill Allowance Trade Scheme (LATS). The goal of these financial drivers is to decrease the amount of Biodegradable Municipal Waste (BMW) being sent to landfills. Table 1 shows that the amounts of Biodegradable Municipal Waste generated (i.e., BMW arisings) will increase from 130,153 tons in 2005 to 161,825 tons in 2020, but the amount of BMW that can be sent to the landfill will decline from 118,839 to 35,282 tons. As a result, the amount of BMW that must be diverted from the landfill will increase from 11,314 to 126,543 tons. Consequently, the borough must

encourage more people to recycle biodegradable waste, which will be sent to composting facilities rather than landfills (Garcia, Clouder, Hall, & Clancy, n.d.).

Year	MSW Arisings (tonnes)	BMW Arisings (tonnes)	LATS-BMW Pemitted to go to Landfill (tonnes)	Diversion Required (tonnes)
2005/06	191,401	130,153	118,839	11,314
2009/10	199,926	135,949	75,700	60,249
2012/13	211,668	143,934	50,421	93,513
2019/20	237,978	161,825	35,282	126,543

Table 1: Projected amount of BMW (in tons) to be allowed into Croydon's landfills (Garcia et al., n.d.)

The landfill tax and the LATS are both in place to encourage the residents of the Borough to use more recyclable products and to dispose of them properly. The landfill tax was raised to £80 per ton on April 1, 2014, which was an £8 increase from 2013. The tax will continue to increase to make the prices of disposing in landfills a luxury instead of a necessity. This is part of the policy and a schedule has not been publically released .The increase in tax will also lead to leading waste producers to seek alternative and less costly waste disposal methods (Croydon Council, 2012). The LATS limits the amount of waste companies can send to the borough's contracted landfills and this allowance declines each year. If a corporation plans to exceed their waste allowance, they can borrow up to 5% of their allowance from the next fiscal year to avoid large fines. If a corporation is substantially below its allowance in a given year, the allowance will be adjusted downward the following year (Department for Environment Food & Affairs, n.d.).

The Croydon Council is currently trying to improve its 'internal' or 'in-house' recycling at its various facilities to bring it more in line with the recycling rates within the borough as a whole. According to our sponsor, the residential rate in the London Borough of Croydon is approximately 45% of households properly recycle and one of the highest rates in Greater London. There currently are no precise data on the recycling rates within the Council's own facilities, but provisional estimates by council staff and contractors indicate it is not close to the rates of recycling by residents and commercial entities in the Borough.

In 2013, the London Borough of Croydon enacted the "Don't Mess with Croydon" campaign. The campaign was put in place to combat the improper and illegal disposal of garbage throughout the Borough. "The Don't Mess with Croydon campaign seeks to crack down on fly-tipping and other environmental crimes in the borough. It sends a firm message to anyone who

blights our borough with litter" (Croydon Council, 2014). The Don't Mess with Croydon campaign has "clean and green champions." The "street champions are a network of people who have volunteered to improve the environment in their local area." (Croydon Council, 2014). The community champions promote the socially responsible disposal of rubbish and also function as a link between the Council and residents of the Borough (Croydon Council, 2014).

2.3 Lessons Learned about Promoting Recycling

Various efforts have been put in place to encourage people to recycle more. Recycling reduces the amount of waste buildup in landfills; therefore it has been promoted further in households and in the workplace. The strategies range from improving attitudes and the use of incentives (e.g. deposits on bottles) and penalties (e.g. fines for the failure to recycle) to convenience and communication in both the public and corporate atmospheres. Depending on a number of variables, some strategies have proven to be more effective than others. The Croydon Council used to have a network of office champions whose role it was to inspire members and employees of the Council to recycle. On each floor, one or more champions volunteered to spread awareness and encourage others. In recent years, the Council has downsized, and the organizer of the champions left. As a result, the champion network disbanded. Our team will investigate reinstating the recycling champion network, as described in Objective 5.

2.3.1 Case Studies for Public Recycling Programs

A case study was conducted in the United States during 2006, in which a national survey was distributed to households regarding the effectiveness of common recycling policies for metal glass and plastics. The survey covered curbside recycling, drop-off recycling, deposit-fund systems, and marginal pricing for waste (Nixon & Saphores 2014). The survey was conducted online through a random subset of an online research panel which was built to represent the U.S. population based on previously determined sampling techniques.

The research survey was divided into four sections in order to obtain a broad variety of information: general questions about environmental attitudes, household waste management, electronic waste recycling, and demographic questions. Analysis of the survey answers indicated a variety of factors affect recycling behavior including convenience, social norms, and moral obligation (Nixon & Saphores 2014). However, the results also reveal that demographics play a

smaller role in the effectiveness of recycling programs. The most evident outcome of the survey was the importance of the community's attitudes towards recycling. The case study also suggests avenues for improving household recycling taking into account all the factors evaluated in the national survey (Nixon & Saphores 2014). This case study illustrates the significant growth of household recycling and the impact recycling has on the environment.

The California Integrated Waste Management Board established a number of incentive programs to encourage recycling. For example, a residential, or "Pay-As-You-Throw" incentive plan involves the adjustment of residential garbage rates. The concept is that a resident pays for the number of bags needed to send their garbage to a waste management facility. This has been found to affect recycling rates by 8-13% (Incentive Programs for Local Government Recycling and Waste Reduction, 2001). Commercial incentives involve raising the price of waste collection and disposal so that companies, etc., will be more inclined to prevent waste. This will lead to greater rates of reuse, recycling, and composting. "Many communities now offer 'free' collection of recyclable materials from small businesses…[and] other communities require their franchised haulers to provide discounts for recycling services." (Incentive Programs for Local Government Recycling and Waste Reduction, 2001).

In 1993, the city of San Jose eliminated the exclusive franchise it had for commercial garbage collection. Doing this allowed more entrepreneurial recycling and waste management companies to experiment with new ways of handling waste and recycling. San Jose implemented franchise fees for all commercial haulers on solid waste. There were no such fees enacted on source-separated recyclables. The city established a system with four steps: Information, Incentives, Mandates, and City services. "To date, the city has decided only to work on the first two levels of this strategy. Staff is working to provide information and technical assistance and encourage business waste reduction through economic and policy incentives." (Incentive Programs for Local Government Recycling and Waste Reduction, 2001).

Another example of a successful pay-as-you-throw (PAYT) program is Worcester, Massachusetts. Worcester instituted its PAYT program in 1993, with the introduction of the yellow bag program. Large 30 gallon trash bags could be purchased for $1.50 each and smaller 15 gallon trash bags could be purchased for $0.75 each. (Handy, 2014). This system has motivated many people across Worcester to recycle more. Within one week of the program start, the recycling rate in Worcester increased from 2% to 38%, and after the first year, solid waste

volume had dropped 47% ("A Long-Running Success Story in a Large City"). By 2014, over $10 million had been saved in waste disposal costs, and Worcester averaged 398 lbs. of trash per capita, compared to the 900 lbs. per capita national average ("Success Story").

In multiple cases, governments have implemented landfill taxes. This had been found to be effective, because saving money drives people very well. Another way to encourage people to recycle is by setting a community goal. These two strategies work very well together, as well. In the case of the EU Landfill Directive,"…local authorities will be unable to use landfill as much in the future in order to comply with the Directive as national recycling targets and increasing landfill tax burdens progressively increase the cost…" (Wilson & Williams, 2007). The study found that in just one year, the Blackburn with Darwin Council's recycling rate rose from 11.00% to 21.26%, more than doubling (Wilson & Williams, 2007).

In the United Kingdom, a case study was conducted on the households in the Royal Borough of Kensington and Chelsea in Greater London. The study conducted two large-scale surveys; the first was performed in 2000 and covered 7500 households and the second, in 2004 covered 3250 households (Read & Robinson 2005). The surveys generated information on the use of local curbside recycling services and the use of bring sites for recycled materials. In just 4 years the amount of households that used the recycling services increased 20%, to a total of 70% by 2004 (Read & Robinson 2005). The study was conducted to evaluate the effectiveness of existing recycling practices as well as promote additional participation.

The Royal Borough of Kensington and Chelsea creates a large quantity of waste and requires a more frequent recycling plan: curbside recycling collection twice a week (Read & Robinson 2005). The key factor of this service that makes it so efficient is its simplicity. Householders are only required to separate their recyclables from the rest of their garbage. In addition to an easier separation method, recyclables can be place in shopping bags, clear recycling bags or designated recycling bins (Read & Robinson 2005). Enhancing the convenience of recycling through simpler separation and curbside pick-up increases recycling rates.

In Rushcliffe Council, a case study was conducted in 2004 which revealed the communication tools residents found to be the most effective for encouraging recycling (Mee and Clewes 2004). Three large-scale surveys were distributed to assess the attitudes of current recycling techniques and services. As a result of the survey, the Council realized the importance

of marketing the change in order to reduce resistance, improve education, reduce waste and increase recycling among residents. From the case study the Council discovered long-term campaigning and encouragement is crucial to the success of the program. Effective communication techniques included media relations, printed material, internal communications and consultations (Nicky Mee, Debbie Clewes 2004).

Although the case studies described above were performed on large geographic areas, similar strategies can be applied on a smaller scale within the Council. Distributing a survey to the employees of the Council will provide insight into the current education and understanding of the internal recycling program. Composing a survey targeted toward the Council employees in particular will give our team a better understanding of areas in need of improvement. Similarly, the communication techniques determined from the Rushcliffe Council case study will be crucial when implementing changes to the Croydon Council's internal recycling program. A new program will be more beneficial with proper communication and campaigning.

2.3.2 Case Studies for Office Recycling Programs

Despite the large amount of information about household programs, there is limited research available for recycling at the corporate level and the influence corporations can have on residents. However, in both household and office recycling, "Investigations have typically found immediate increases in recycling behavior with prompting and reinforcement procedures, but maintenance of recycling behavior has presented problems." (Brothers, Ktamtz, McClannahan, 1994). It has been found on multiple occasions that many improvements in recycling behaviors due to material incentives drop off once the incentives are removed. However, when providing informational handouts and bins for people to use in their homes, it was found that recycling behaviors were improved and maintained in the long term (Brothers et al, 1994).

Similar to the case study done in Kensington and Chelsea evaluating convenience of recycling, another study explored recycling rates compared to proximity of bins to workers in the office. In this study, it was found that when paper bins were provided in close proximity to workers, disposal of paper into trash bins decreased by about 87%, and paper recycling rates increased from 28% to 88% (Brothers et al, 1994). In a follow-up to the study, paper recycling rates were found to have increased again to 92% (Brothers et al, 1994).

Another study found through multiple trials using various different types of incentives that the most effective ones were the use of champions and competitions (Wells, Gregory-Smith, Manika, Graham, 2013). These champions were called "green liaison officers", and their job was to inform about recycling and encourage it. Competitions between different sections of the office and the promise of bragging rights brought about the motivation for workers to out-perform their colleagues, and together with the knowledge and encouragement being provided by the green liaison officers, these two techniques complemented each other (Wells et al, 2013). At the same time, however, the study noticed that these two things alone did not have the greatest effect on employee recycling habits. It found that the greatest impact on habits was produced by improved infrastructure. That is to say that employee recycling habits improve the most when bins are made more accessible, more information is provided and made easier to find, and when the general atmosphere is more conducive to recycling (Wells et al, 2013).

From our research, we have found that not very much information is available on recycling incentive programs for the office. There seems to be a general urge to make recycling compulsory for the public, resulting in examples of incentive or penalty programs for the public, but it is clear to us that it can be difficult or impossible to enforce recycling in the office or penalize employees for not recycling. It seems to be that while incentives are a valid idea to consider, the more significant strategies are education and intrinsic motivators. Although information on successful office incentive programs for recycling is scarce, through our project, we aim to develop specific in-house solutions, such as a combination of educating the employees about proper recycling practices and recognizing them when they exhibit these proper practices.

2.4 Conclusion

From our background research, our project team determined methods for improvement that can further optimize the Croydon Council's in-house recycling program. We gained further understanding of waste management in the United Kingdom, Croydon's approach to waste management, and lessons learned about promoting recycling. This insight provided us with a stronger foundation on which to build our project solutions.

3. Methodology

The goal of this project was to evaluate Croydon Council's current recycling practices and provide recommendations for improved strategies. To accomplish this goal, the team:

- Identified best practices for effective recycling in offices;
- Clarified plans, policies, and guidelines for Croydon's current in-house recycling program;
- Conducted a baseline assessment of Croydon's in-house recycling program;
- Evaluated employee opinions about Croydon's in-house recycling policies and practices;
- Developed a recycling improvement plan and strategies based on the data from objectives #1-3.

This project took place in the Bernard Weatherill House located in the London Borough of Croydon, United Kingdom from March 16, 2015 to May 2, 2015. The Croydon team worked closely with Malcolm Bell and Bob Fiddik as well as other members of the Croydon Council involved with the recycling initiative. Our main focus in London was surveying council employees and interviewing council staff from neighboring boroughs on office recycling programs to build on our background research conducted in the US. All the interviews were conducted following the same general protocols described in the next section. The tasks associated with each objective are summarized in Figure 4.

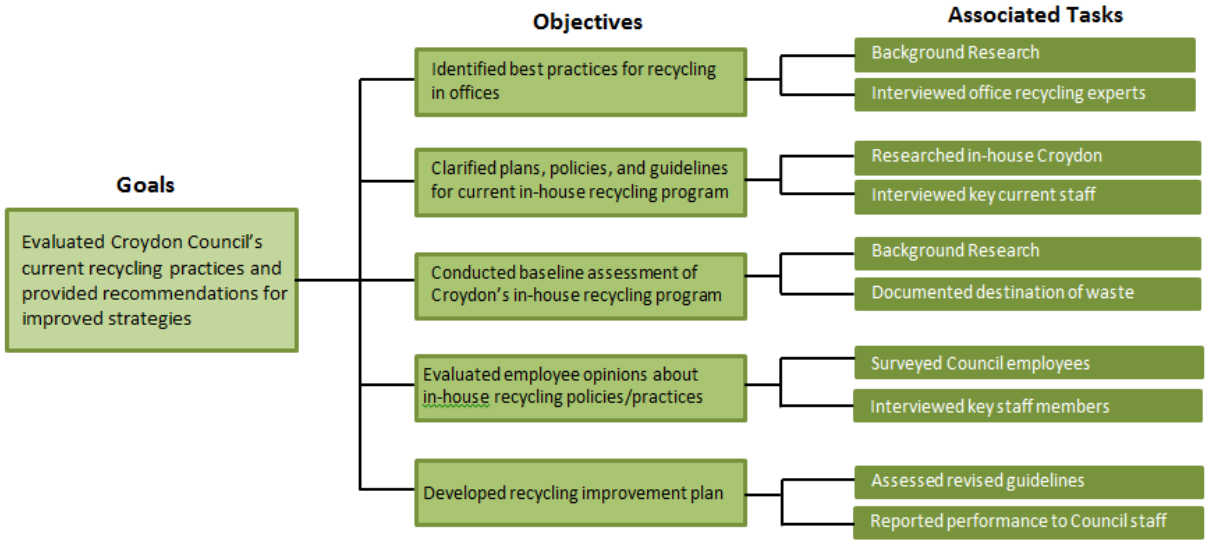

Figure 4: Objectives Tree Diagram

3.1 Interview Protocol

Interviews with leading experts - representatives responsible for recycling in other councils - on in-house and office recycling programs provided our team with examples of effective programs to be suggested as part of the revised recycling plan for the Croydon Council. Additional interviews were conducted with current Council staff to acquire further clarification about opinions on the current practices within the office. The interviews were conducted in a semi-formal structure and the general protocol is described below. The steps can be summarized as: developed a baseline interview script, identified potential interviewees, made initial contact, and conducted the interviews.

3.1.1 Develop a Baseline Interview Script

A generic interview script was developed based on the background research conducted and information from our sponsors, Malcolm Bell and Bob Fiddik. In conjunction with our sponsors, we produced a straightforward outline of major topics we wish to discuss (Appendix A). We modified the primary set of questions and topics based on feedback from the sponsors.

3.1.2 Identified Potential Interviewees

Multiple methods were used to identify key individuals to be interviewed. Our team identified boroughs with efficient recycling programs and experts on in-house practices based on our background research and suggestions from our sponsors. In terms of the baseline assessment described in Objective 2, interviewees consisted of the custodial staff within the Council as well as the Weatherill House's total facility management provider, Interserve. Both the custodial staff and Interserve provided further clarification about how waste is collected from within the Council building and how it is distributed to other disposal locations.

3.1.3 Made Initial Contact with Interviewees

Prior to contact, our team conducted background research on each of the interviewees to acquire a further understanding of their role within the Council. The contacts for interviewees from other boroughs were obtained through Council websites or suggestions from our sponsors. Through these interviews we were able to identify key aspects of successful recycling programs in other boroughs. For the interviews with Croydon Council and Interserve staff, our sponsors set up times and locations for us. Our team was able to meet with interviewees and obtain further

information about the internal policies and guidelines. We sent the potential interviewees an email, as shown in Appendix B, requesting their participation.

3.1.4 Conducting the Interviews

We conducted in-person interviews whenever possible using a semi-structured format that promoted a more conversational style and allowed us to follow up on unanticipated topics that required elaboration. We began each interview with a preamble (Appendix A) that explained the nature and purpose of the interview. We sought implicit rather than formal consent and asked the interviewee for permission to quote them either using their real name or a pseudonym to preserve their confidentiality. The interviewees were also provided with the right to review our final report prior to publication. During the interview, one team member served as interviewer and the other as scribe.

3.2 Objective 1: Identify Best Practices for Effective Recycling Programs

In order to identify the best practices for effective recycling programs, our team interviewed experts on in-house or office recycling programs. Boroughs and other organizations with effective recycling programs were identified based on background research and recommendations from our sponsors. We also developed a snowball sample by asking all our interviewees for referrals to other recycling experts. The recycling experts were interviewed based on the protocol described above. We interviewed representatives of corporations within Greater London that have developed effective corporate recycling programs within their offices, such as the London Fire Brigade in Central London. We contacted the boroughs either through an email (Appendix B) or brief phone call to set up a phone interview which followed the protocol previously described. Although we reached out to all the boroughs, we were only able to interview some of them. Our team focused in particular on boroughs known to have state of the art recycling approaches. We contacted every London borough and conducted interviews with representatives from two boroughs by phone (Sutton and Waltham Forest) and three in person (Kingston, Camden, Bexley). We also conducted an interview and site visit with the London Fire Brigade. These interviews helped determine what approaches (e.g. champions, incentives, etc.) have been most effective for encouraging compliance and behavior change in the office environment. In summary, the purpose of these interviews was to identify the attributes

that make office recycling programs more or less effective and obtain additional ideas on how to improve Croydon's policies and guidelines.

Our team faced some difficulty in scheduling times to take tours of other boroughs' facilities. When initial emails received no response, we followed up with a phone call. Due to previous scheduling, some boroughs did not have time for us to make a site visit. We did however, schedule phone interviews with these boroughs to gather further information about the successful recycling programs. By interviewing multiple boroughs with successful recycling programs, our team was able to determine beneficial recommendations for the Croydon Council.

3.3 Objective 2: Clarify Current in-house Recycling Policies

Upon arrival in the Council, our team interviewed key Croydon staff members and reviewed internal information inaccessible to us while in the United States in order to determine current practices, policies, and guidelines. Our sponsors identified interviewees and we conducted the interviews following the protocol previously described. Our team interviewed the head of facilities management for the Council, the head of the Interserve team, and the Interserve Operations Manager for the Council, as shown in Table 2 below.

Name	Job Title
Colin Stone	Head of Interserve Team
Chris Quinn	Interserve Operations Manager
Mark Norrell	Head of Facilities Management

Table 2: Contact Names

From the interviews, we received information about current in-house recycling programs from Croydon Council employees. This information determined the effectiveness of the recycling program and helped assess what methods are followed and/or ignored among employees. We also received additional information from our sponsors regarding what recycling practices were currently in place. Speaking with employees and our sponsors provided us with opinions from both the employee and management sides.

3.4 Objective 3: Baseline Assessment of Current Practices in the Council

In order to recommend good recycling practices, our team conducted a baseline assessment of current practices and performances within the Croydon Council. Our sponsor emphasized that preliminary recycling programs are already in place, but the guidelines are not compulsory. To establish a set of recommendations for the Croydon Council we analyzed the effectiveness of the current recycling program.

The Council manages buildings in various locations within the borough and our team evaluated multiple building's recycling bins to ensure there are separate, identifiable bins for various waste, including but not limited to paper, plastic, food waste, etc. Our team specifically analyzed the recycling practices within the Bernard Weatherill House, the Town Hall/ Clock Tower, and Jeanette Wallace House. Currently, the recycling is collected by Interserve and quantified by counting the number of bags. The Interserve staff analyzes the clear plastic bag to determine if the recycling has been contaminated. Contaminated bags cannot be recycled and are disposed of as garbage. Our team asked the custodial staff and Interserve employees to participate in an interview based on the interview protocol previously explained. Our sponsor conducted preliminary contamination research and provided us with this information upon arrival.

One of the issues our team faced was that data collected by Interserve was inaccurately monitored resulting in ambiguous data. The data collection method did not clearly specify how many bags were contaminated in comparison to the total number of bags. This resulted in an inaccurate measurement of contamination and total waste production. A revised data sheet was created and new data was collected. Our team also individually shadowed Interserve operatives to acquire further understanding of how the waste is collected. Our team split up to follow three operatives responsible for waste management and collection within the Bernard Weatherill House. At the end of the day, our team compared the techniques of the operatives which are explained in the findings sections, below.

The Council's main building is the Bernard Weatherill House; however, there are additional buildings the Council is responsible for. According to our sponsor, not all of the buildings exhibit the same recycling habits so was difficult to have a consistent level of evaluation among them. Being aware of these variances early helped to avoid problems with data collection and confirm the results are efficient for all of the Council buildings.

To supplement the baseline assessment, we distributed a survey to the Council employees, as described in Objective 4. The results of the survey were compared with the baseline data to show reported behaviors (in the survey) match actual behaviors (as revealed in baseline data).

3.5 Objective 4: Evaluating Council Employee Opinions on Recycling

To gain a better understanding of the current council recycling situation, we surveyed all levels of council employees regarding their opinions and habits relating to the Croydon Council's current and future plans.

The survey was developed in conjunction with our sponsor to insure their needs and expectations were met. In the sections below we discuss the survey instrument development, pretesting, implementation, and analysis.

3.5.1 Survey Development

Since the survey was sent out via email to the entire Croydon Council staff mailing list, it was formal in nature and included a small number of closed and open-ended questions. Our sponsors identified the initial set of survey questions and we consulted with them to refine the survey questions, response categories, and format. Our sponsor requested that we develop the survey using SurveyMonkey, an online survey generating tool. In order to insure privacy, the survey was anonymous. We asked for names and email addresses from people who were willing to participate in follow up interviews. The identifying information was kept separately from the question responses to insure the anonymity of the data and no identifying information was reported in the survey results.

The survey (Appendix C) began by asking the employee if they have residency in Croydon and what the Boroughs recycling rate is. The survey then asked the employee which floor s/he works, in order to identify office areas that are stronger or weaker at recycling. The survey then asked questions regarding the habits of the employee. A sample question from this section of the survey was, "For each of the items below, please let us know you can recycle them in your office". This type of question had a yes, no, or I don't know check box for each material. Examples of materials that were included in this section will be paper, plastic bottles, and food

waste. Items such as food waste were included because they are not recyclable and the answers associated with the non-recyclables show the recycling knowledge of the office.

The second section of the survey intended to explore how well staff understands Croydon Council's recycling policy. This section included questions such as "What percentage of office waste in your building do you think is currently being recycled?" The answers for this question were presented in a drop down list with ranges of 10% starting from 0-9% and ending at 90%-100%. These data will inform us how well the Council informs their employees of the office recycling policy.

The third and final data section evaluated the opinions of the employees. This section included questions such as, "Do you think the labelling on the bins in your office are clear?" The answers to this question were again yes, no or I don't know. The data from this section allowed us to approach the problem in a more concise manner as a result of the overarching feelings towards recycling.

The survey closed with an optional section where the respondent can leave their name and contact information. This indicated the respondent was willing to talk to us face-to-face. Due to a large number of responses, small group interviews were conducted to gather further data about recycling in the office.

3.5.2 Pretesting and Implementation

In order to pretest our survey, we completed an internal review among our advisors and sponsors. The survey was distributed to the entire Council staff via email on 24 March 2015. A reminder was sent out on 30 March 2015. Our team supplemented the emails with intercept surveys in the café, collecting seven complete paper surveys. Overall, we received 438 survey responses. We used the built-in Survey Monkey analysis and supplemented these with more detailed analysis.

3.6 Objective 5: Develop a Recycling Improvement Plan and Strategies Based on Data Collected

As the final step of our project, we worked with our sponsors to develop a proposal outlining recommendations for improvements to the recycling program based on our research findings.

Based on our background research and methods previously described, our team determined overlapping themes in other successful recycling programs. We compared and contrasted the practices of multiple boroughs in order to determine what suggestions were most beneficial to the Croydon Council. Our team took into consideration pros and cons of each scenario, which can be found in detail in the "Recommendations" section below.

After completing our report, we wrote up a separate summary of our findings that we gave to our sponsors. This summary consisted of more concise figures clearly depicting the trends and results determined from our findings. They will refer to this summary in the future to make sure that recycling practices continue to improve within the Council.

4. Findings and Analysis

We present our findings in four parts below: “Case Studies of Recycling Practices in London”, “Current Recycling Practices”, “Evaluating Employee Knowledge”, and “Evaluating Employee Opinions”. Our research helped us gain a better understanding of effective recycling programs, obtain insight into the current recycling program within the Croydon Council, and determine the most beneficial recommendations for the internal recycling of the Council.

4.1 Case Studies of Recycling Practices in London

We interviewed representatives of corporations within Greater London that have developed effective corporate recycling programs within their offices, such as the London Fire Brigade in Central London. We closely examined the recycling practices and policies in four London Boroughs including, Kingston, Sutton, Camden, and Bexley as well as the London Fire Brigade.

4.1.1 Kingston

Our team conducted an interview and site visit of one of the main council building, Guild Hall 2, in the Royal Borough of Kingston upon Thames on 25 March, 2015. Recycling is compulsory for residents within the borough; however, it is not mandatory for employees within the Council building. In order to improve recycling within the Council, Kingston joined the South London Waste Partnership.

Although recycling for Council employees is not mandatory, financial drivers entice management to be motivated. The effort from employees justifies the efforts the facilities management team puts into recycling and energy saving campaigns. For example, the money saved through recycling outweighs the cost of posters, new bins, etc. Although the Council does not provide the staff with educational materials, the majority of the employees are aware of what materials go in each bin. As a result of employee understand, most materials end up in the proper bins. The Council does, however, have some problems with contamination. For example, half full cups of coffee will sometimes be placed in the paper recycling and end up contaminating the clean paper.

While aiming to improve recycling, Kingston was also keen on reducing their carbon footprint. In order to promote energy reduction, the Council implemented a “Switch Off”

campaign. The campaign was originally promoted largely through posters around the office. Kingston found continuous reminders and promotion were extremely beneficial. The employees responded positively to various modes of communication (i.e. emails, posters, newsletters, etc.). The Council also developed a team of volunteer "Green Champions" who went through training to learn further information about reducing energy consumption. The role of the champions included helping design and hang-up campaign posters, encouraging colleagues around them to switch off lights or the computer when not in use, and serving as an additional reminder for the campaign. The continuous encouragement and reinforcement allowed for the campaign to be successful and even after the campaign, the employees continued using improved energy saving habits.

The building our team visited, Guild Hall 2, is one of the main council buildings but there are many other council owned buildings throughout Kingston. There is not a uniform recycling set up across these satellite sites because separate buildings have varying waste contracts. Guild Hall 2 has a waste management contract that specifies waste is collected by volume, more specifically by truckload. This means the Council is charged for every collection no matter how full the truck is (it costs the same amount for half a truck as it does for a full truck). Therefore, the Council aims to reduce the amount of waste collections. The Council does however inform employees about how to properly dispose of less commonly recycled materials, even if the collection is not available within the building. For example, there is nowhere within Guild Hall 2 to recycle batteries but employees are encouraged to recycle them at a local supermarket. Additionally, bulky items, such as photocopiers, are also recycled properly. As part of the service with the copier company, old copiers are removed when new copiers are installed. The supplier is responsible for cartridge disposal and all of the machine packaging is clearly labeled to ensure materials are recycled properly.

The Kingston Council continues to make adjustments to improve recycling within the Council and reduce the carbon footprint. The Council's success is due largely to the continuous communication through reinforcement and advertisement of the implemented campaigns.

4.1.2 Sutton

Our team conducted a phone interview with a representative of Sutton Council on 26 March 2015 to obtain further insight into what made their recycling program successful. The first step Sutton took to improving recycling within the Council buildings was to remove individual bins located under the desks of all the employees. In place of the under-desk bins, the Council created common waste areas with recycling bins and landfill waste. To encourage employees to recycle even further, Sutton found success in labeling the landfill bin as "Your Last Resort." This reminded employees to check to see if waste was recyclable or compostable. As part of the improvements, Sutton introduced a "Zero Waste Campaign" in which the Council altered the waste management contract to increase the amount of recyclable materials collected. The Council also conducted a waste analysis to identify what materials were causing the landfill waste to fill up. Results showed paper towels were being thrown into the landfill bin instead of being recycled. In order to reduce this waste build up, the Council installed hand dryers within the buildings.

The campaign was successful because it was promoted through internal communications and all of the employees were informed of new changes. A sustainability team was formed of volunteers who were responsible for informing the facilities management team of problems. The Council informed the entire staff about the sustainability team and exactly what they were expected to do. It was crucial for the team to be approachable and have a positive view of recycling within the Council. Along with the sustainability team, the Council implemented a recycling champion network made up of volunteers passionate about recycling. The recycling champions were responsible for encouraging recycling within the Council. The combination of recycling champions and the sustainability team was the main reason why the new system was successful. Employees were continuously reminded of why it is important to recycle and also had someone to go to with specific questions or concerns about the new system.

The most important aspects of implementing the new system for Sutton were labeling, communication, and cost analysis. Labeling the recycling and landfill waste bins was a simple but effective tool to clarify what materials were recyclable. Sutton found that pictorial labeling was extremely helpful for communication with the cleaners who collected the bins since English was often a second language for them. Communicating the new improvements to the Council staff and the cleaners ensured everyone was aware of the system in place. Doing a cost analysis

of the recycling program in Sutton was a large driver for the improvements, since the Council is charged more for landfill waste than for disposing of recyclables. By utilizing smaller bins for landfill waste it encouraged employees to recycle and ultimately reduced the amount spent on landfill costs. With the smaller landfill bins employees were less likely to throw recyclable materials into the landfill waste. Sutton is currently part of the South London Waste Partnership and continues to make improvements to their Council's internal recycling program.

4.1.3 Camden

Our team visited the London Borough of Camden on 23 April 2015to explore the current in-house recycling practices. Like Croydon, the Camden Council recently moved into a new building which is located at 5 Pancras Square in Camden.

James Dunlop and two members of his team described the current policies and practices and emphasized that the Council does not focus on office practices so much as recycling in the borough as a whole. This is illustrated by the fact that Camden has Green Champions for the entire borough. We have encountered a number of local authorities who have a system of Recycling Champions or Green Champions within their councils, but Camden is the first we saw with external Green Champions. These Green Champions are volunteers from throughout the borough who educate people about recycling and encourage them to do so.

Camden also emphasizes education over enforcement, since the staff believes that informing people about why they should recycle and how to do it is more effective than threatening them with a fine or other penalty. Within the Council, they have been quite creative with their educational schemes. For example, in one campaign, staff dressed up as various waste items, such as a Coca-Cola can. This drew reactions and questions from other employees, and the members of Mr. Dunlop's team took advantage of this to educate the staff about recycling. During Camden's recent move into a new building, they eliminated under desk bins and provided bins for recycling food wastes. It is tempting for staff to put all wastes and recyclables in one under desk bin and then throw the whole lot into the landfill waste rather separate out the recyclables. Therefore, removing the under desk bins reduces the likelihood of recyclables being sent to landfill. By providing separate food waste bins, the food waste can collected and sent off to be composted instead of being added to a landfill.

Figure 5: Camden Council food waste bin

While Camden emphasizes education, and they know that it is important to reduce landfill waste, they also aim to reduce paper waste. They generated a lot of paper waste last year in moving out of their old building and into their new one. However, in the new office, they are encouraging the employees to take on a more paperless approach, and part of this is reinforced by the fact that they do not have filing cabinets, but just small compartments or 'cubbies' to store papers. Having limited storage space motivates employees to store documents electronically.

Camden has four waste streams: general waste (landfill), mixed recycling, confidential waste, and food waste. Camden Council does not separate the mixed recyclables into mixed paper & card and bottles & cans, so staff does not have to spend time separating items and this encourages them to recycle more because it is easier to do. It also cuts down on contamination. As seen in the Kensington and Chelsea case study, the key factor of an efficient recycling program is simplicity. Camden used a similar method to enhance the convenience of recycling through simpler separation. General waste, mixed recycling, and food waste are collected daily, and confidential waste is collected weekly. General waste is collected in a black bag, mixed recycling is collected in a clear bag, and food waste is collected in a green bag. This way, it is easier for the employees bringing the bags down to the large collection bins to tell which is supposed to go where, reducing the risk of contamination.

Figure 6: Camden Council general waste and mixed recycling bins

Figure 7: Camden Council confidential waste bin

In terms of communication with the staff, Camden employs a number of strategies. They put recycling information up on monitors throughout the council and on the intranet, teaching staff how to recycle and encouraging them to recycle. In addition to this, they keep track of their recycling rates and report them to the staff to let them know how they're doing. Also, as mentioned before, Camden has Green Champions, who do a great deal in communicating

objectives to staff and citizens. Finally, there is an annual staff survey asking for feedback on current policies.

In 2017, as part of the Camden Waste Challenge, the Council will be re-evaluating their public waste contract to improve their curbside recycling procedures. Currently, within the Council, recycling collection costs £50 less per ton than general waste collection.

4.1.4 Bexley

Our team conducted a site visit to the London Borough of Bexley Council at 2 Watling Street. We met with a team to discuss how they transitioned the recycling policies to a new building, and the details of their internal recycling program, including waste contracts.

Similar to the Croydon Council, the Bexley Council recently consolidated some offices and moved into a larger, newly renovated building, similar to the Croydon Council's recent move to the Bernard Weatherill House. Like Croydon and Camden, the Bexley Council also removed under desk bins following the move to a new building and received negative feedback. Bexley implemented a quick fix to this problem by encouraging staff to gather recyclables at their desks during the day and take the recyclables to the large bins themselves at the end of the day. This encouraged them to make fewer trips to the large, communal bins and reduced the inconvenience of losing the under-desk bins. The Bexley Council generates the same four types of waste streams as the Croydon Council; paper and card, bottles and cans, food waste, and general/landfill waste.

The Bexley Council's waste contract renewal and office relocation coincided allowing the Council to conduct a test in one of the offices that would merge into their new Council building. The bins pictured in Figure 8 below, shows a standard set of bins that were placed around the new office. The blue bin is a mixed paper and card collection bin, the gray bin is for bottles and cans, and the split green and white bin is for mixed glass and general/landfill waste respectively. Food bins were placed under the counter tops in each kitchen area as seen in Figure 9. Food waste bins can accept the majority of food scraps, but also paper towels, cups, and wrappers from the café are compostable. The sign above the food waste bin specifies these less common compostable items to increase employee awareness.

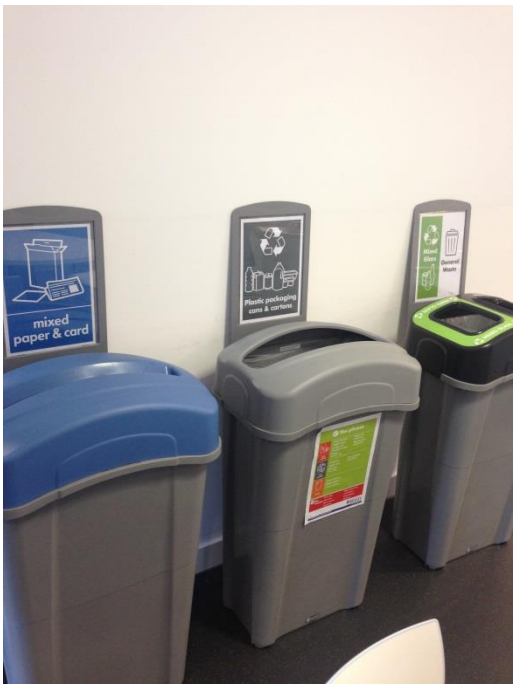

Figure 8: Bexley Council waste collection bins

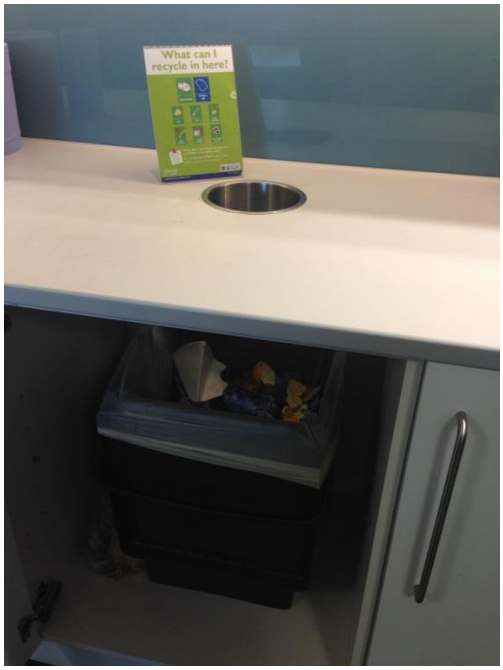

Figure 9: Food waste bins in Bexley Council

Under the previous contract, employees would have to collect their own under-desk recycling bins and take them to the collection bins outside. Under the new contract, the recycling bins described above were placed in key locations around the office to increase the

convenience of recycling. With this improvement, the maintenance staff was required to take the recyclables and waste from the office bins to the main collection bins. The new contract also encourages the Council to promote more recycling within its offices because each pick-up of recyclable waste costs less than a pick-up of landfill waste. After the facilities management team completed the trial, the bins were approved for placement in the new Council building.

As a part of the transition, the Bexley Council began a thorough communications campaign. The Council first conducted a visual waste audit of what the bins on each wing in each floor. Once the analysis was completed, a list ranking each wing was sent to the Council mailing list. The following month, a second waste audit occurred. The rankings switched and the Council office as a whole saw incorrect waste disposal reduced from approximately 23% to 8% contamination levels. Each month for the first six months of 2012 had a campaign associated with it. For example, May was about hard plastics because the waste audit showed that hard plastics were being caught more in the wrong bins. The human relations department was vital in the communications. The front page of the intranet had a recycling post to coincide with the recycling campaign that was in place, briefings were sent to staff, managerial newsletters included information about recycling campaigns, and posters were posted around the Council. The Council has a compulsory iLearning module during the induction process of any new employee. Prior to the building switchover, the same module was included in an induction for the new building. Employees were not able to swipe their ID badges to access the building if they had not completed the induction. Lastly, the Council used the savings they retained from recycling as motivation. The money saved could be used to maintain an extra person's salary. The Bexley Council continues to evaluate their recycling policies and take advantage of the small changes they can to improve the system.

4.1.5 London Fire Brigade

Our team conducted a site visit to the London Fire Brigade headquarters, located at 169 Union Street in Southwark on 1 April 2015. We met with Tanya Broadfield to discuss the waste management contract and the success of the internal recycling program.

The London Fire Brigade (LFB) is the third largest fire rescue organizations in the world, providing services to 32 boroughs and the city of London. The London Fire Brigade not only aims to protect lives and land within Greater London; one of the main objectives of their mission

statement is to be a leader in environmental and sustainable development. Since implementing an improved recycling program 8 years ago, the LFB has been extremely successful reaching a 98-99% recycling rate as of 2015.

Prior to the change in practice, LFB adopted 33 different waste collection contracts, a separate service for each borough. With this system, keeping track of 103 fire stations was extremely difficult for the waste management team. LFB fire firefighters are often transferred to other stations due to staff numbers or events and since almost every station used to have different color bins, labels, and recycling availability, it made it difficult for the staff to recycle properly. About 8 years ago, the facilities management team amalgamated the contracts creating a uniform recycling system across every station. The first five-year contract was formed with a waste management and recycling company, Bywaters, to ensure each station had the same bins, labels, and educational materials. Having a uniform contract allowed the London Fire Brigade to obtain data of recycling percentages. The new contract also helped save the organization money because it was less expensive to recycle than to send things to landfill. Clarifying bins and labels decreased the amount of recyclables thrown in to general waste and therefore reduced the weight of the landfill bins. Recycling rates within the first five years increased but facilities management wanted to continue to improve.

After the five years with Bywaters, LFB developed a new waste contract with McGrath, which remains their current waste provider. The facilities management team developed the contract based on a weighted scale: 40% price and 60% quality. This means facilities management chooses the contract that will provide the best results at the most reasonable price. Multiple contractors provide potential bids, and the facilities management team determines which contract meets their requirements. Of the 60% quality section, 10% is related specifically to environmental concerns, including waste reduction and recycling. Prior to making a decision, the LFB ensures the chosen contract has enough information about environmental concerns to meet their 10% target. One of the most important additions to the contract was that McGrath is now responsible for providing the London Fire Brigade with educational resources, such as posters and leaflets. The performance of McGrath is monitored by Key Performance Indicators (KPI) which allows the LFB to ensure targets are met. The KPI's include targets for health and safety, user satisfaction, recycling rates and diversion from landfill. If targets are not met, the contractor can be monetarily penalized which ensures the effectiveness of the program.

Since the contract alterations were made, the internal recycling rate of the London Fire Brigade has increased to approximately 98-99%. Within the main office building, the waste is collected in two locations: a "wet hub" and a "dry hub". In the wet hub, there is a sink for any coffee or tea that can be disposed of properly before recycling the cup. On the counter, there is a row of bins consisting of a food waste bin, a recycling bin, and a general waste bin. On the LFB internal website, there are pictures and descriptions of what food is acceptable for each bin, as shown in Appendix D. Having the bins right next to each other makes recycling just as convenient as throwing something in the general waste; therefore people are more inclined to dispose of recyclable materials properly. In the dry hub, there is only a paper recycling bin located on the counter because the dry hub is only used for printing and making copies. Next to the copier, there is a confidential waste bin that gets shredded offsite but since shredding costs the London Fire Brigade money, it has been designed to blend into its surroundings more so than the recycling bin. The cost of confidential waste is much greater than that of regular paper recycling; therefore the LFB does not want excess paper placed in the confidential waste bin. The main office building has also made an effort to recycling less common materials such as batteries and nylons. Additionally, when the fire hoses reach the expiration date, the LFB has the material recycled into bags, belts, or wallets. Some of the fire hoses are also donated to a local, monkey zoo and are used as vines and padding for the fences. The fire brigade has also partnered with a local art group that promotes the use certain recyclable materials for artwork. As of March 2015, the LFB was collecting tights to create a large ball that will be displayed to the public. Nylons and tights are not materials that are well-known for being recycled. By working with the art group to produce the nylon ball, it makes employees of the LFB think about other materials that can be reused.

The London Fire Brigade has also been developing techniques to increase recycling rates across all of the stations. Each station has adopted the uniform set of bins, as previously described, for dry paper, food waste, and general waste. This minimizes waste disposal confusion when fire fighters are transferred to a different station. The LFB has also implemented a green champions program consisting of approximately 300 champions, allowing for at least one champion per shift per station. The champions are volunteers who are enthusiastic about protecting the environment and are willing to encourage their colleagues. The main role of the green champions is to distribute and discuss "Toolbox Talks" to small groups of colleagues. The

toolbox talks, as shown in Appendix E, are among the educational materials McGrath supplies to the LFB as required in its contract. Information about recycling, energy savings, and other environmental concerns are organized into one sheet of paper that the green champions can present to their colleagues easily in approximately five minutes or less. As a result of the toolbox talks, all the LFB employees have access to the same educational material and are made aware of all the policies and practices in place.

The London Fire Brigade has been successful meeting their recycling targets in part due to having one distribution center. The van service collects all of the materials in one trip and brings it to a central location where it is sorted further. Having one service system for all waste streams saves the London Fire Brigade money and also reduces the carbon footprint by utilizing minimal van trips. Even the landfill waste gets sorted again at the facility and any waste that cannot be recycled, becomes waste to energy through incineration. With a 98-99% recycling rate, the London Fire Brigade is confident sharing their targets with the public. Currently the LFB is ISO 14001 environmentally certified. The certification consists of a range of principles and methods to follow them. An external auditor ensures all standards are met and allows the LFB to publically promote that they are ISO 14001 certified. The London Fire Brigade continues to make improvements and ensures they are recycling as efficiently as possible.

4.1.6 West Sussex

We interviewed Mr. Norrell, head of facilities management, at Croydon Council on March 26, 2015. Before Mr. Norrell came to the Croydon Council, he was in charge of recycling in the corporate estate in West Sussex. In West Sussex, the local authority recycling was essentially based on the facilities management's own drive to recycle. Unfortunately, with budget cuts and layoff in recent years, council priorities shifted and more sophisticated recycling and waste management programs were replaced by simpler and cheaper waste collection protocols.

West Sussex had a simple recycling policy during the time of Mr. Norrell's tenure. There was one bin for landfill waste, and one for recyclable waste. There were no direct incentives to encourage the staff to recycle; the system merely relied on members of the staff knowing that there was a bin for recycling and one for general waste. It was difficult to monitor and encourage individual staff members to recycle appropriately. Although the recycling and waste bins were

conveniently co-located to minimize trips and traffic, staff could easily dispose of their recyclables and wastes in the wrong bin if they failed to pay close attention and separate materials.

Mr. Norrell explained that West Sussex used to separate general paper waste from confidential waste which was shredded. Unfortunately, employees did not always properly dispose of their confidential waste. To avoid the possibility of confidential paper ending up in the general paper waste stream, the council adopted a policy that all paper waste went through shredding and then was sent to paper recycling.

Mr. Norrell believes that one area where Croydon may be able to learn from the experience of West Sussex was in terms of labelling on the bins. West Sussex used pictorial labels, which made it easier for an employee to quickly look at a bin and know if they could use it to dispose of something without reading any words. Another practice from West Sussex that Croydon might consider is the use of real numbers to illustrate the advantages of recycling.

4.1.7 Summary of Findings

Table 3 summarizes the strategies that different boroughs have used to encourage recycling, and Table 4 summarizes some of the key elements of each strategy.

	Emphasized Strategies				
Borough/ Organization	Education	Communication	Labeling	Champions Network	Waste Audit
Bexley	•	•	•	•	•
Bromley	•	•			
Camden	•	•	•	•	
Kingston Upon Thames		•		•	
London Fire Brigade	•	•	•	•	•
Sutton		•	•	•	•
Waltham Forest		•		•	
West Sussex	•	•	•		
Croydon	•		•	•	•

Table 3: Summary of Emphasized Strategies

Borough/ Organization	Important Findings
Bexley	• Effective communication is essential • Trash compactors reduce waste volume and contract costs • Visual waste audit results presented to employees
Bromley	• Information session describing policy changes • Removed under desk waste bins to reduce excess waste • Waste management practices same as residents
Camden	• Strong recycling message throughout borough • Utilized color coded bags • Effective communication to open discussion
Kingston Upon Thames	• Multi-media communication more effective • Green Champions essential part of program
London Fire Brigade	• Green Champions essential part of program • Uniform waste contract across all facilities ○ Created unique contract to satisfy internal targets • Effective Education through Toolbox Talks • Separate Hubs (Wet and Dry) • Recycling less common materials • Emphasized reuse (batteries, fire hoses, etc.)
Sutton	• Green Champions essential part of program • Financial Evaluation • Effective Labelling • Sustainability Team Awareness
Waltham Forest	• Green Champions essential part of program Effective communication (e.g., poster campaigns)
West Sussex	• Mixed recycling • Pictorial labelling

Table 4: Summary of Findings from site visits

These tables indicate that the different organizations use a wide variety of approaches to promote recycling. Many of the strategies are quite similar, but there are also substantial differences. One key finding from our research is that the most successful recycling programs, such as those at Bexley and the London Fire Brigade, emphasize a balance of all the approaches from education and communication to waste audits. Table 3 also indicates that Croydon has pursued most of these strategies in the past. The findings we present below, however, indicate that there is room for improvement in each of these areas. For example, Croydon used to have an active network of champions promoting recycling within the corporate offices, but this network has become less active due to staff changes and redundancies. Similarly, the council has started an auditing process to track recycling performance since they moved into the new offices at Bernard Weatherill House, but the auditing process is flawed and has not yet delivered high quality

quantitative data that can be used to encourage staff to follow recycling procedures. Additionally, as our research below will reveal, many of the labels that were installed when the new offices opened have since gone missing. Finally, members of staff have indicated in our interviews and through an office-wide survey that the Council should be doing more to educate employees about recycling policies in the offices. Our team has taken all of these categories into consideration when developing our recommendations for the Croydon Council.

4.2 Current Recycling Practices

The Croydon Council consists of multiple buildings, the largest of which is the Bernard Weatherill House. Other buildings within the Council include the Town Hall/Clock Tower complex, Jeannette Wallace House, and Davis House. Each Council building serves a different purpose. The Town Hall/Clock Tower Complex serves as an office to the Borough's elected officials, registrars' offices, library, and other public services. The Bernard Weatherill House serves as the main office building where a majority of the Council's business occurs. These two facilities will be further detailed in the following sections.

As noted previously, our team interviewed Mark Norrell, Facilities Manager in the Croydon Council, to get an understanding of his initial reactions to the recycling program at BWH. When he first arrived at the council in March 2015, he believed the recycling program was relatively effective, however, he quickly learned that the labelling on the bins was lacking. He believes that the most successful way to motivate people to recycle more properly is to take a holistic approach. The more people see those around them following the policies, the more they will encouraged and inclined to dispose of their waste correctly.

Mr. Norrell emphasized that negotiating an appropriate waste and recycling contract is key to the success of the program. He hopes that the next Croydon contract can be structured so that decreasing waste and increasing recycling will save money by itself and that recycling will cost less than collecting waste. Being part of the South London Waste Partnership may help, but he is also curious about the costs and benefits of having a trash compactor. Since the Croydon Council pays for collection by volume, it could be cost-effective to invest in a trash compactor depending on the cost of a compactor, the cost of an annual charge for servicing it, and the cost of the contract with the compactor company.

On the whole, Mr. Norrell believes that the biggest challenge is education. One thing he particularly recognizes is that there is a difference between the generations. For example, older people tend to leave the tap on when brushing their teeth and leave lights on when they leave the room, while the younger people turn the tap and the light off. He believes that without education many people are unaware of the impacts of these kinds of simple actions.

On 31 March 2015, our team also had the opportunity to meet with two members of the staff who were recycling champions when the champion network was active in the Croydon Council. They asserted that there is a much lower percentage of recycling in the office than in the borough, and that is partially attributable to the fact that the amount of information and encouragement given to staff has been on the decline. At the same time, however, recycling in Bernard Weatherill House is easier than it was in the Taberner House, because it is built into the design, so in their opinion, there is no excuse to not be recycling more.

In terms of contamination, the two champions recognize that it isn't necessarily clear which bins things are supposed to go into. They say that it would be best to have no tolerance for contamination, because if any contamination is tolerated, then anyone will say "oh well I can throw one in and it will be fine." They understand that it would not be practical to expect everyone to rinse everything out before recycling it, but they think it would be reasonable to expect people to empty a container of liquids or foodstuffs before recycling it. They both agree, however, that it needs to be more clear which types of waste go in which bins. They suggested presenting employees with a quiz about what goes where.

Regarding the possible reinvigoration of the champion network, our interviewees believed it would be more likely to be successful if some senior managers in the Council supported it. They also suggested a reinvigorated network should aim to have a champion representing every zone and from each service. They emphasized that all champions need to be enthusiastic about the goals of the program, but that champions should not be too passionate or they risk alienating other staff. Another potential role a champion could fill that they brought up was reporting to their line manager when they notice a recycling problem in their zone.

We had a lengthy talk about how the Council could improve its recycling practices and in what areas the Council falls short. The first thing the two recycling champions raised was the fact that while recycling is compulsory for residents in the borough, it is not compulsory in the Council buildings. They also thought that it might be confusing for people who work in the

Croydon Council but live in other boroughs with different recycling policies. On top of this, since moving into BWH, people started bringing food into work more, with multiple kitchens on each floor to prepare food and more places to sit, eat, and chat. Since people bring food in more, naturally, waste in general has increased. Our interviewees averred that many people throw away an entire bag of waste from a meal without any effort to separate waste and recyclables appropriately into the bins provided. The two champions believe that it would be beneficial to have better labelling on the bins. This could include attaching lists and/or pictures of things that can be recycled in each bin. One final thing they thought might be useful in increasing recycling in the Council is the possibility of providing bins for recycling batteries.

We briefly discussed the idea of implementing incentive programs, and while the two champions did not have ideas specific to incentive programs, they did emphasize the importance of educating the staff. They think it would be beneficial to inform staff about the entire recycling process through to eventual disposal, including visuals and possibly a video. Another component to this education concept is that if a new system is going to be implemented, any changes need to be fully organized and developed prior to being released to the staff. The staff is more likely engage in the changes if they are made aware ahead of time.

4.2.1 Bernard Weatherill House

The Croydon Council has recently made adjustments to their recycling program after moving into the Bernard Weatherill House. Waste hubs were taken into consideration during the design phase of the building to ensure the recycling and waste bins would be easily accessible and convenient for all the employees. There are a different number of waste hubs on the floors depending on how large the floor is. The largest floors are floors 1-4 because they have a separate annex on the side of the building. On these floors, there are 5 waste hubs evenly distributed throughout the floor. Floors 5-7 only have three waste hubs because they are smaller floors and have less employees working there. The 8th floor is where the café is located. There are five waste hubs on this floor: three are located inside the café and two are located outside the café where there is seating available for employees. The café creates more waste than 5-7 and therefore requires more bins even though the floors are the same size. Floors 9-12 are the smallest in the Bernard Weatherill House and therefore only have two waste hubs; one on either side of the floor. On all the floors there are small kitchen areas available for employee use. Every

kitchen area has a waste hub located next to it intended to increase convenience of properly disposing of waste when making meals.

All of the waste hubs have the same triangular ("Toblerone") labels built into the bin (Figure 10) that are intended to reduce confusion about the different waste streams. Originally, the bins also had laminated labels that were attached to the bins using adhesive. Over the past few months, these labels have fallen off and were not replaced or reattached. The labels for the bins are clearly explained below in section 4.2.1.2: Bin Labeling. Similar information about labeling can be found on the intranet page, however, this information is not easily accessible. Many employees do not utilize this information and some do not even know it exits. The recycling information available to the employees on the intranet is shown in Figure 10, below.

Figure 10: Bin descriptions on the intranet

This information is not easy to read and employees are required to look through the lists of small text to find whether or not certain materials are recyclable. Our team explored alternative solutions to this problem in our recommendations.

The waste is collected by Interserve operatives who walk the floor throughout the day. Our team shadowed three Interserve operatives to gain further understanding of how the waste is collected and where it goes after the waste hubs. The details of the waste collection methods are expanded upon further in Section 4.2.1.1: Interserve Shadowing.

4.2.1.1 Interserve Shadowing

We shadowed three Interserve operatives to obtain a better understanding of the waste collection process in BWH. An operative is assigned to certain floors, and throughout the day, they go around to all the bins on those floors, keeping track of what is in them. This includes

reducing contamination by making sure that visible items are in the correct bins, and taking full bags down to the goods-in room in the basement. Due to the café on the 8th floor, a trolley cannot be taken around to collect full bags. On all other floors, however, the operatives collect all waste streams on one trolley.

While this is the overall waste disposal practice, we did notice some variation between the approaches of our different operatives. One operative worked very efficiently, correcting most obvious contamination in the bins by the time he had to collect a given bag. He moved quickly through the floors, and he had little trouble keeping up with the bins and keeping track of which bags are which when he got down to the basement. This operative had a good understanding of the collection method, and was able to work quickly and effectively.

The second operative was a multi-service operative, meaning he had a large number of jobs to do aside from just collecting waste. As he walked the floor, he would separate partial contamination but occasionally had to put other jobs ahead of waste collection. When the bags were full, he would take them down to the basement and separate them into the proper large waste bin. Any overly contaminated bags would be tallied on the contamination sheet and placed into the landfill bin.

The third operative was less familiar with the expected collection protocol. He had started working at BWH less than two weeks prior to our shadowing him. This operative separated very minimal contamination and occasionally confused paper and plastic, creating additional contamination. He was also unaware of the recycling symbol located on many materials, making it more difficult for him to properly separate the waste streams.

From shadowing the operatives, we determined Interserve should improve education among its staff, permanent and temporary, in order to ensure the appropriate practices and protocols are followed. Education along with tips for doing the job efficiently would help the operatives during collection and would reduce the likelihood and extent of contamination and other errors in recycling.

4.2.1.2 Bin Labelling

Throughout the Bernard Weatherill House, there is a large discrepancy in the number of labels at each waste hub. A waste hub consists of a “Landfill”, “Bottles & Cans”, and “Paper & Card” bins with labels stating what can be disposed of in each bin, as seen in Figure 11.

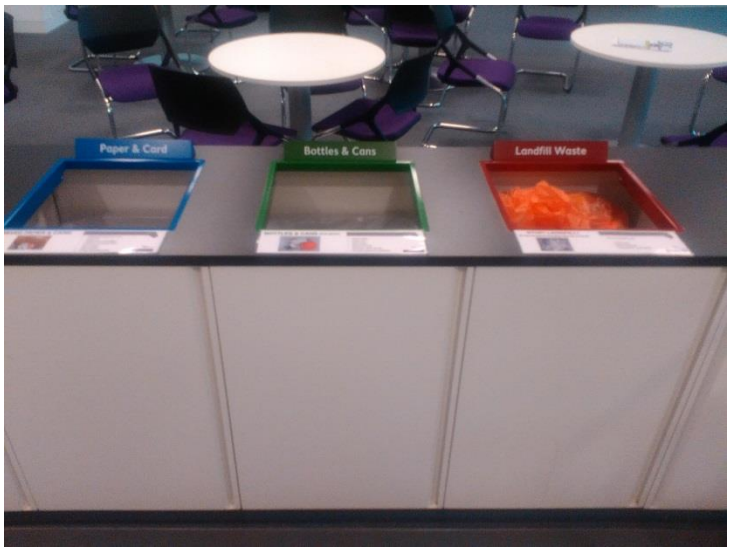

Figure 11: Croydon Council waste station with complete labelling

Figure 12 shows each laminated label, which contains details of what can go in each of their respective bins.

Figure 12: Labels for the Croydon Council waste stations

The results of the audit are depicted in Table 5 and Figure 13 show the label distribution by floor for that floors waste stations.

	Waste bins with…			
Floor	**NO LABELS**	**1 LABEL**	**2 LABELS**	**3 LABELS**
1	2	0	0	1
2	4	0	0	0
3	4	0	0	1
4	4	0	1	0
5	0	0	0	3
6	2	0	0	1
7	2	0	1	0
8	5	0	0	0
9	2	0	0	0
10	2	0	0	0
11	2	0	0	0
12	2	0	0	0
Total (39)	31	0	2	6

Table 5: Bin Labelling in Bernard Weatherill House

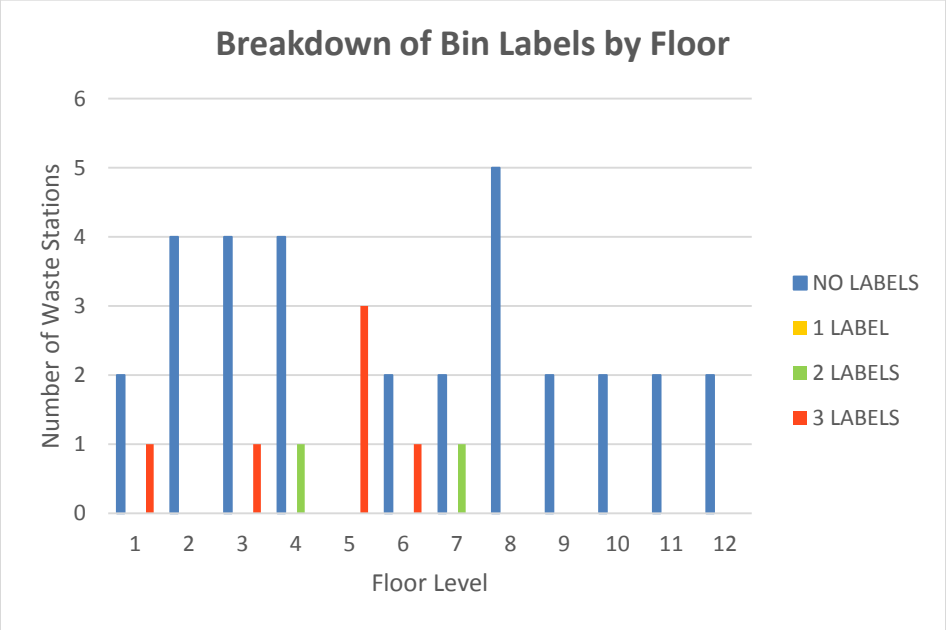

Figure 13: Bin Labelling in Bernard Weatherill House

Figure 13 shows that floors 8 through 12 have no labels on bins at all, while the lower floors have a large number of missing labels. Figure 14 shows that overall almost 80% of the original labels in the BWH are now missing.

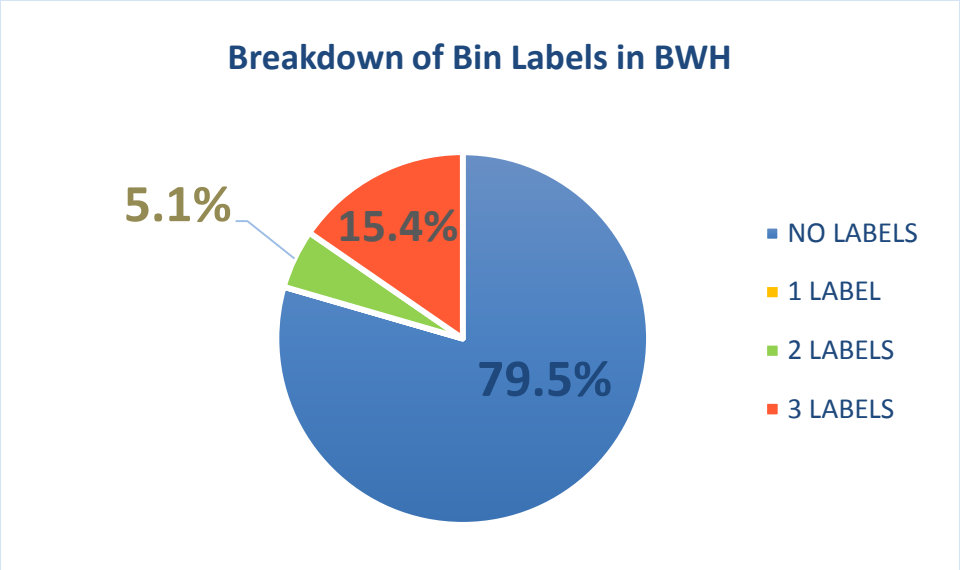

Figure 14: Percentage of labels per waste station (n=39 waste stations)

4.2.2 Town Hall and Clock Tower

Town Hall is a building located next to Bernard Weatherill House run by the Croydon Council. It consists of the main Town Hall, Clock Tower, and Library. We visited the Town Hall multiple times to assess the recycling procedures. In the maps provided below, the hatched area represents the Town Hall while the unhatched area represents the Clock Tower and Library. Within all of these sections of the building, there are some rooms open to the public while others are for staff members only. Our team was able to see every room in the Town Hall; however, we were not able to access every room in the Clock Tower. Therefore, we were only able to identify waste streams for the rooms we analyzed, as labeled in the maps below.

The ground floor of the Town Hall (hatched area on Figure 15) consists of registration offices (G5-13) where people meet staff to fill out and file paperwork regarding births, marriages, and deaths the Foyer consisting of a public waiting area for the registrar's offices, and the Main Lobby, which is where the reception desk is with a small waiting area. A majority of the waste from this floor is paper waste given the nature of the services provided, although other waste will be generated by staff (e.g., bottles, cans, cups, etc.) and the public bringing in similar items.

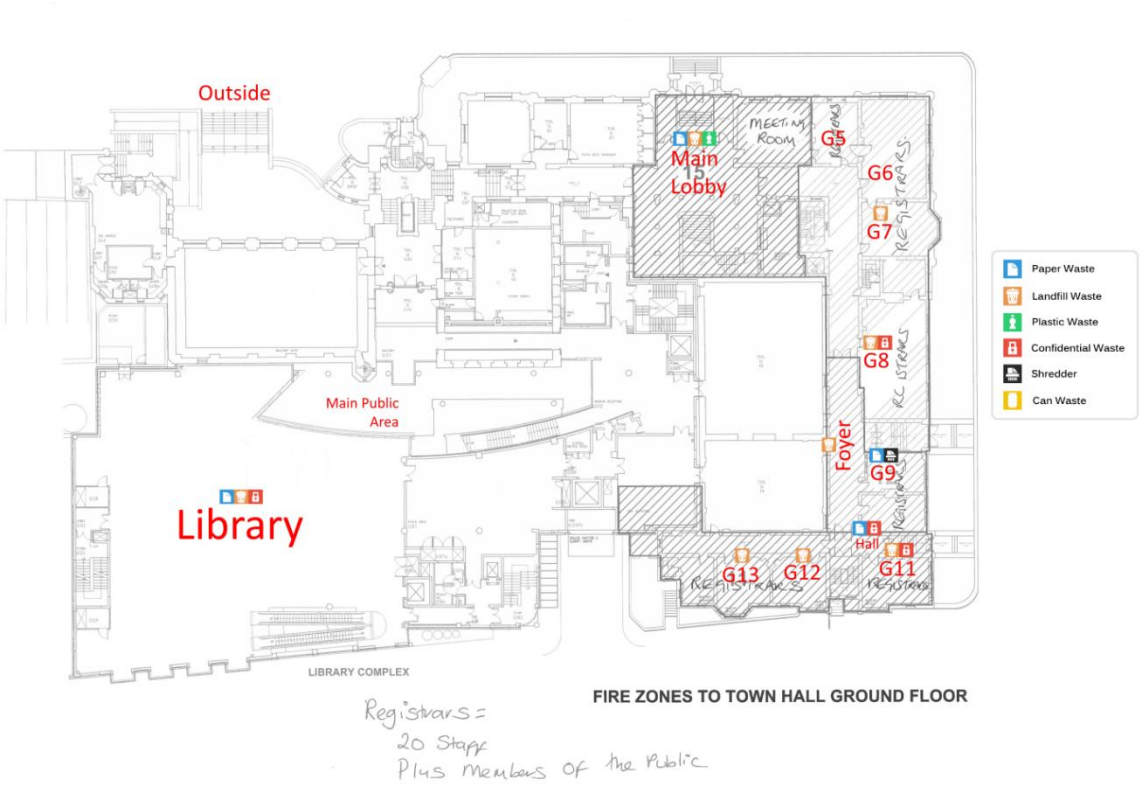

Figure 15: Town Hall ground floor map

There is an insufficient number of confidential recycling bins on the ground floor compared to the amount of waste produced. Confidential waste bins are locked bins with a small slit in the cover that can only fit paper. Only members of staff are allowed to use these bins due to the sensitive nature of the documents as well as the fact that it is more expensive to dispose of. The added cost of confidential waste is a result of the documents needing to be shred off-site, requiring an additional collection. The ground floor also has fewer landfill and bottles and cans bins than the other floors because the entire floor is open to the public. The public areas have no bins because the Council is concerned about health and safety issues based on previous experience. For example, members of the public have thrown bins at staff or set bins alight. In order to reduce the likelihood of risk, the Council has removed almost all of the bins from the public area and only provides one small waste bin in the library. This is not a preferred solution, however, because removing the bins also decreases the convenience and accessibility of recycling for the staff and the public. All the bins in the main foyer are hidden behind a bulletin

board in the back corner, under the stairs for aesthetic reasons. The Town Hall has an elegant atmosphere and large plastic bins would detract from it.

The majority of the first floor of the Town Hall and Clock Tower is also open to the public excluding the mayoral secretariat and the Labour Group Room. The Town Hall is represented by the hatched section on the map below while the Clock Tower and library is the unhatched area. Paper and confidential waste are the common waste streams of this floor, as well. This floor has a large function hall (area between F8 and the Labour Group Room) where catered events occur (Figure 16).

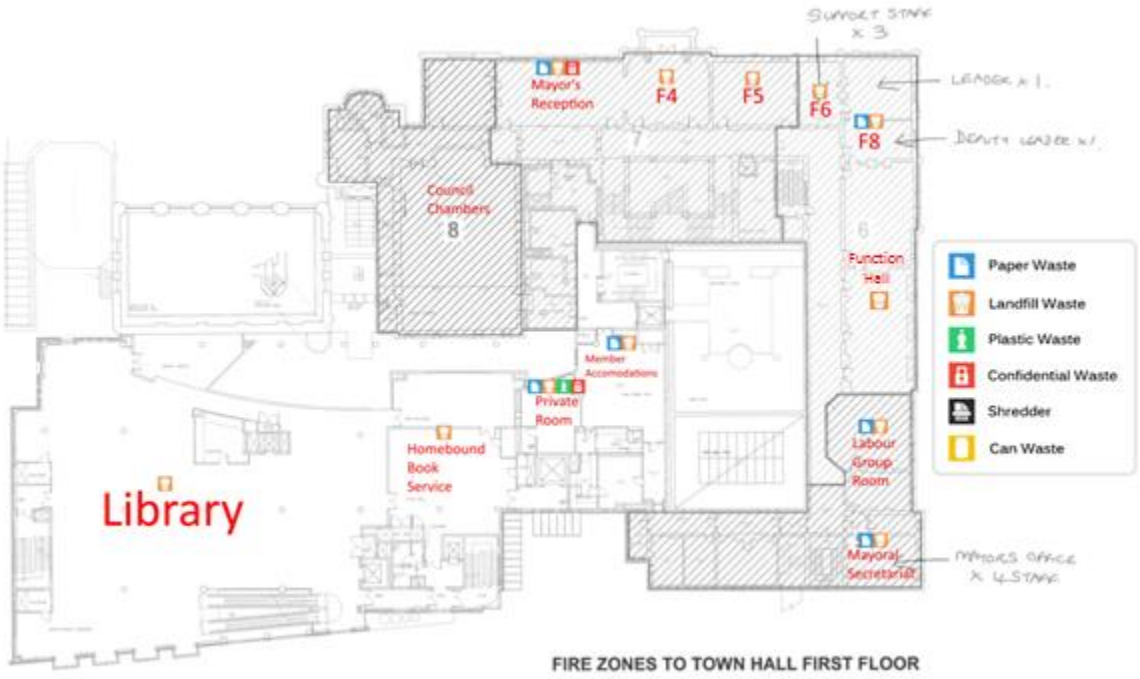

Figure 16: Town Hall first floor map

The function room only has one small landfill waste bin because any waste that accumulates from events in this room is handled by the catering company. The function room is also used for meetings that are not catered. Similarly to catered functions, the waste created is collected in one landfill bag whether or not items are recyclable. Not having access to recycling in the function room increases the amount of landfill waste ultimately costing the Council more money for disposal. The Council Chambers room is where the Council meets to discuss events and issues. There is a section of the room, known as the public gallery, which is open for the public during the meetings. This area lacks disposal bins because the Council does not want any

food or drinks in the area. A landfill and recycling bin located right outside the public gallery would be beneficial for encouraging people to dispose of any food or drinks prior to entering the chambers. Another area of weakness in the Town Hall is the council offices (F4-8). Offices F4, F5, and F6 only have landfill despite the need for plastic recycling. The majority of the waste created in this room is paper, however, there are food and drink items consumed in these areas and recyclable items are currently thrown into landfill. Some of the employees have started a collection of plastic bottles in a cardboard box which they bring to an available plastic recycling bin in the kitchen area. F8 and the mayor's reception have multiple waste streams available in the same location providing more access and convenience to recycle. Although the rooms are located adjacent to the council offices, the employees would have to walk through other employees' offices to recycle their waste properly. Due to the inconvenient bin placement and limited availability of bins, many employees dispose of their waste in the landfill bin available.

The third floor of the Town Hall consists of an archival room and emergency control room. We could only see one archival room, but it was also not an area where a lot of waste is produced. The emergency control room is more utilized during any borough-wide emergency, such as flooding. The emergency control room has bins for recycling, confidential, and landfill wastes. The employees who work in this room permanently said that for a normal work day, the bins were sufficient, however during an emergency situation, they may be overrun. During emergencies, there are a large number of people present for extended periods of time, leading to an increase in waste beyond the capacities of the bins.

Similar to the Town Hall, the library has its own unique recycling challenges. The library has three floors all available for public use; however, there are offices for the librarians and a storage room not accessible to the public. There are small waste bins for trash in the public area. However, there are rules in the library bylaws that do not allow people to eat in the library. Paper recycling bins are present behind the circulation desks for librarian access only, in order to reduce the likelihood of food and drinks in the library. The ground floor of the library also has a confidential waste bin behind the circulation desk which is only accessible by the librarians due to the higher cost of disposal. The library storage room does not have any waste bins, but this is a result of only needing to dispose of books in poor condition. Employees are not allowed to have food or drinks in this area so only a paper recycling bin is needed.

The adult learning center, or CALAT (Figure 17), is the best equipped area that we saw on the tour of the Town Hall, library, and public areas in terms of bins. Landfill, bottle, and paper bins are all available in the hallways of the adult learning center as seen in Figures 18, increasing the likelihood of employees and the public disposing of their waste properly.

Based on discussion with Chris Quinn, one of the biggest recycling challenges for this area of the building is that there is a multiplicity of languages spoken in the public area. Due to the lack of native English speakers, visitors often do not understand the recycling labels and therefore are not able to properly dispose of waste. From our findings of site visits with other boroughs, as mentioned in section 4.3, we believe that pictorial labeling will be beneficial to the Town Hall and Clock Tower. Clarifying labels will help reduce contamination as well as reduce the amount of recyclables being thrown into landfill bins.

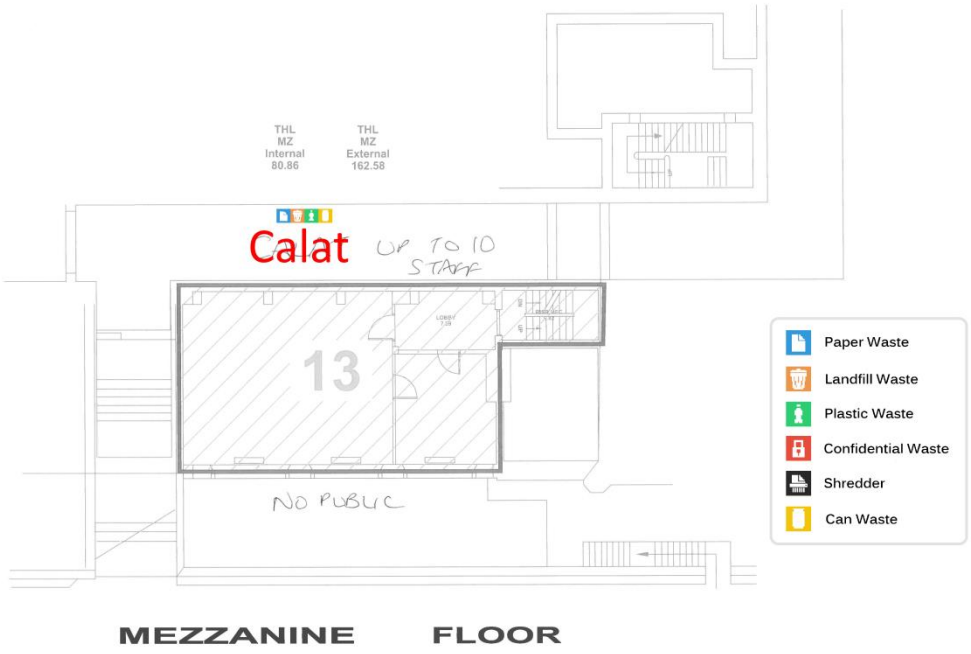

Figure 17: CALAT map

Figure 17: CALAT Bins and Labels

The last room we saw in the Town Hall complex was the bin shed, though this is not illustrated on the maps. The bin shed is where all the bags of waste are put into large bins for collection. Similar to the protocol of the Bernard Weatherill House, if a bag is contaminated it will go in the landfill waste bin. Landfill and paper product bins are picked up twice per week, while bottles and cans are only picked up once per week. The current collection schedule is not effective for the Town Hall because the bins are often over capacity, as seen in Figure 19 below.

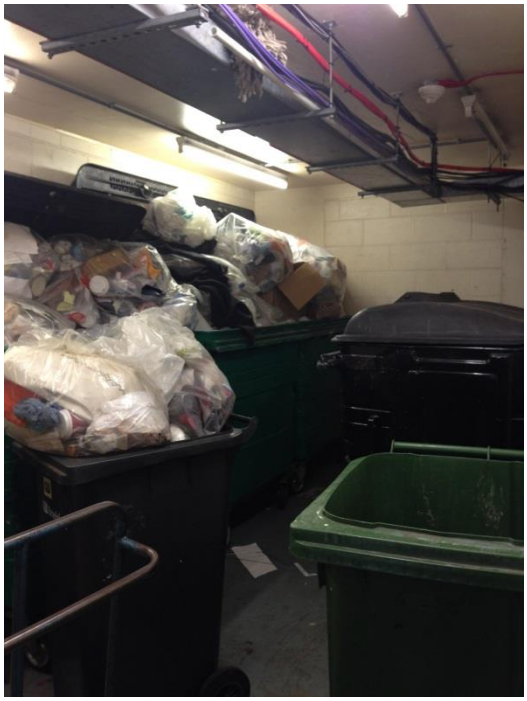

Figure 19: Town Hall Bin Shed

Although recycling efforts have been made to improve the Bernard Weatherill House, it is important for the Croydon Council to consider the satellite sites, such as the Town Hall and Clock Tower, in order to increase internal recycling rates. As a result of the tour, our team determined different rooms within the Town Hall serve different purposes and therefore generate various kinds of waste. The waste streams range from paper only to mixed recyclables and food waste. In the majority of the rooms, at least one waste bin is present; however, most of the provided bins do not match the kind of waste generated. The above maps can be utilized by the Council to determine locations in need of new bins. Increasing the availability and accessibility of recycling and waste bins will increase recycling rates for the Council and reduce the amount of contamination.

4.3 Evaluating Employee Knowledge

To supplement our site visits and observations, we conducted a survey of staff knowledge and opinions about recycling. The survey that we conducted was sent out to the entire Council and we received 438 responses, including 356 (81%) from the Bernard Weatherill House. Sixty-eight percent of respondents from BWH indicated that they thought the council needs to do more to educated staff about the reasons for recycling (Figure 20).

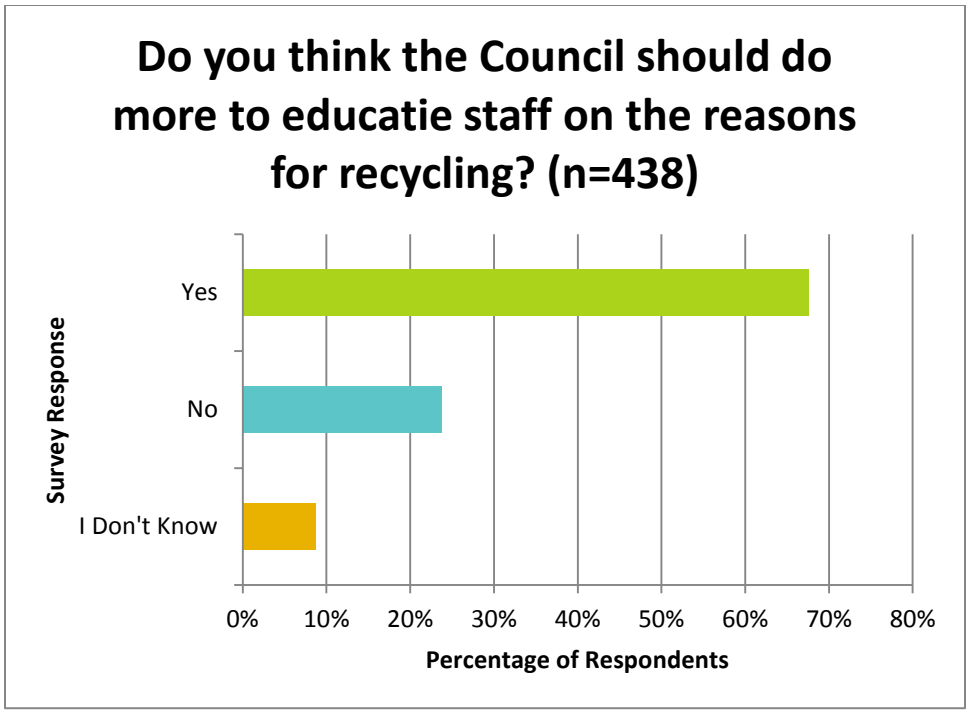

Figure 20: Council wide respondents who believe the council should educate staff more about recycling

An even higher percentage of respondents (91% or 387/438) believe that the Croydon Council should report how much waste is recycled in the Council (Figure 21).

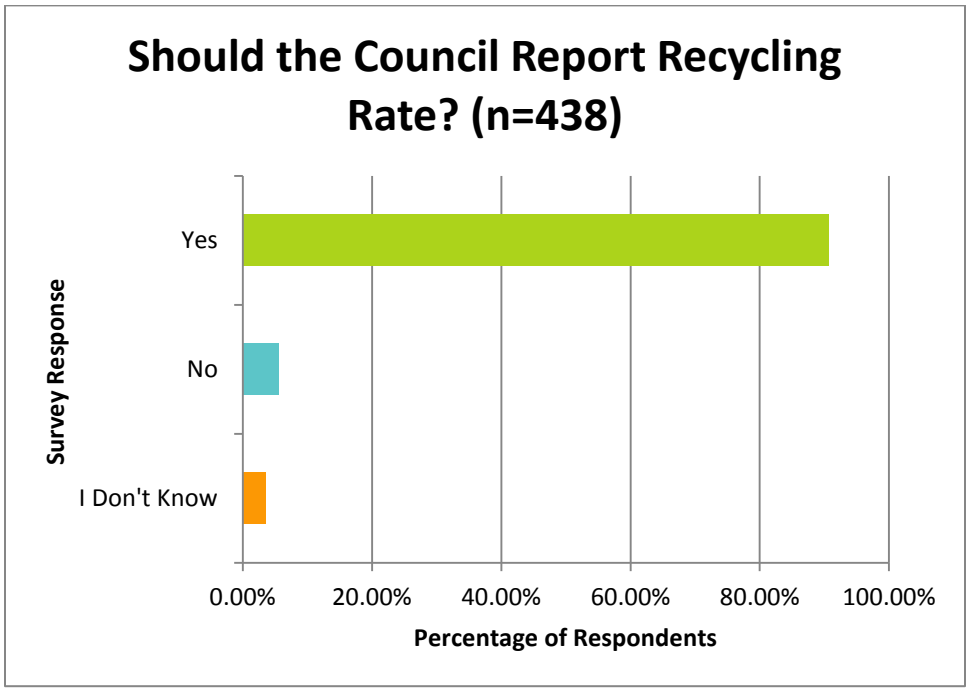

Figure 21: Respondents answers to the Council self-reporting recycling rate

Since moving into the Bernard Weatherill House, the Council the rate of recycling has ranged between 40% and 60%. The recycling rate, however, is somewhat uncertain since it is based on the number of bags of recyclables versus bags of landfill waste and does not take into account the differences in size between different bags for food waste versus other recyclables as seen in Figure 22. Furthermore the way in which the bags are tallied by operatives (Figure 23) may lead to errors, especially where an unknown number of bags are contaminated.

Figure 22: Food waste bag (top) and waste station bag (bottom)

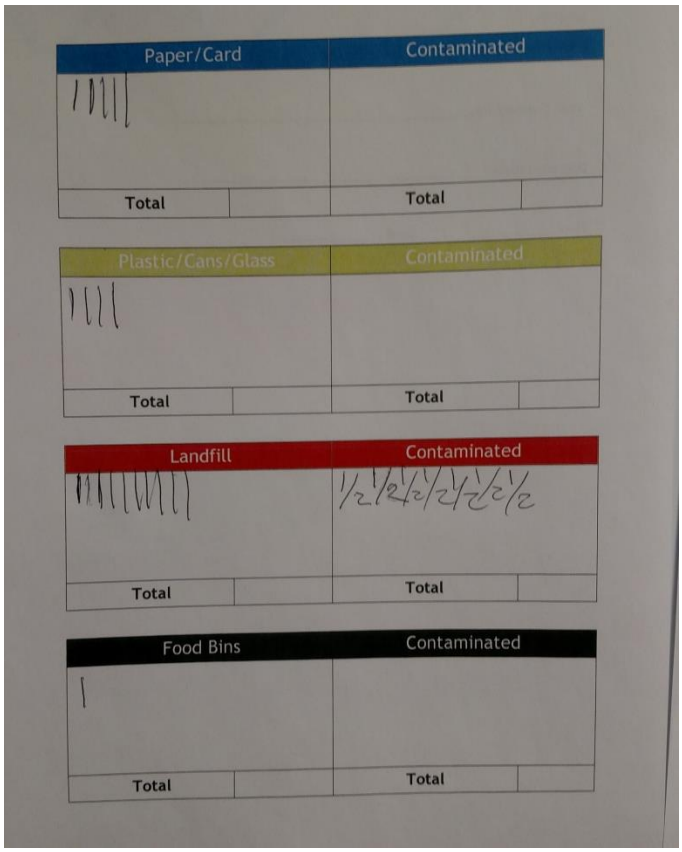

Figure 23: Recycling data collection sheet

Figure 24 reveals that council staff has a limited knowledge of the recycling rates in the council offices since only 25% correctly indicated a rate between 40 and 60%. This also indicates the need for more feedback to staff about recycling performance.

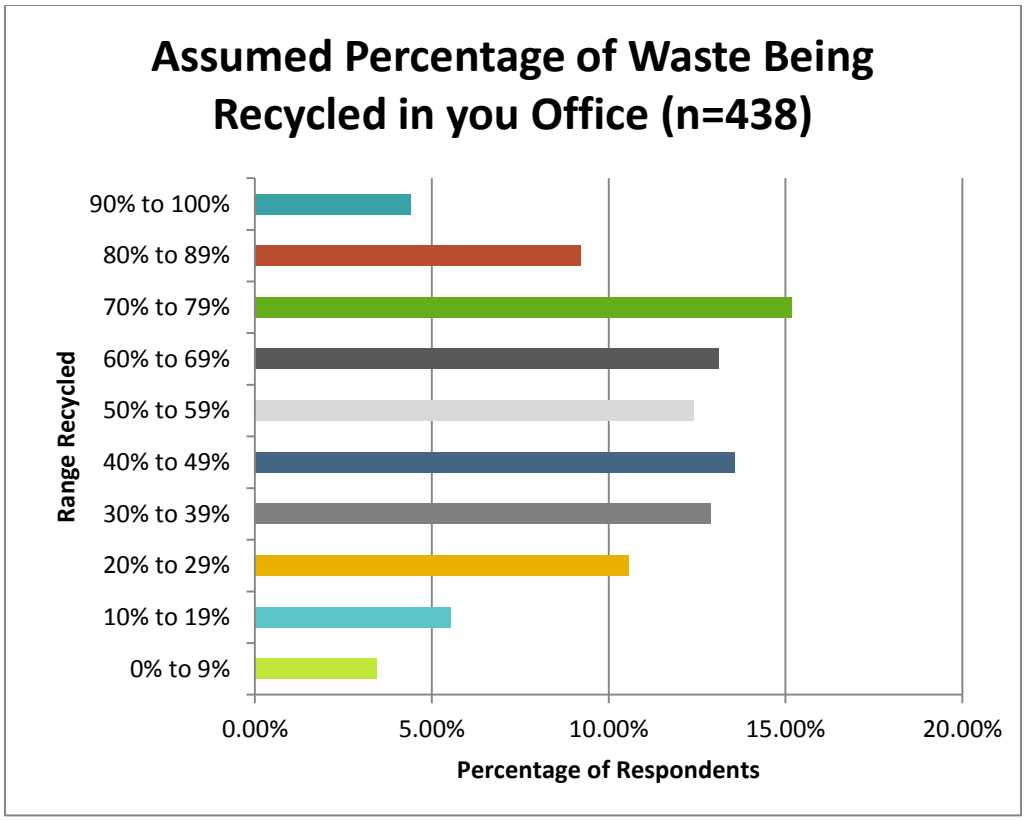

Figure 24: Survey results for recycling rate within the Council

Figure 25 shows that the vast majority of employees in BWH know where to place paper, cardboard, plastic bottles, metal drink cans, and food wastes for recycling, but are much less certain about what to do with less common recyclables, such as plastic food trays and tetra packs. Relatively few BWH staff knew that batteries and Britta filters cannot be recycled at BWH. Only 11% of respondents (41/334) were able to answer correctly if and how the nine items identified could be recycled. If we exclude batteries and Britta filters, the proportion of staff able to correctly identify recycling options for the other seven items increases to 33% of respondents Figure 26 highlights the increasing proportion of staff who are unable to identify what to do with some of the less common recyclables. Both these figures illustrate the need for additional education and labeling efforts in BWH.

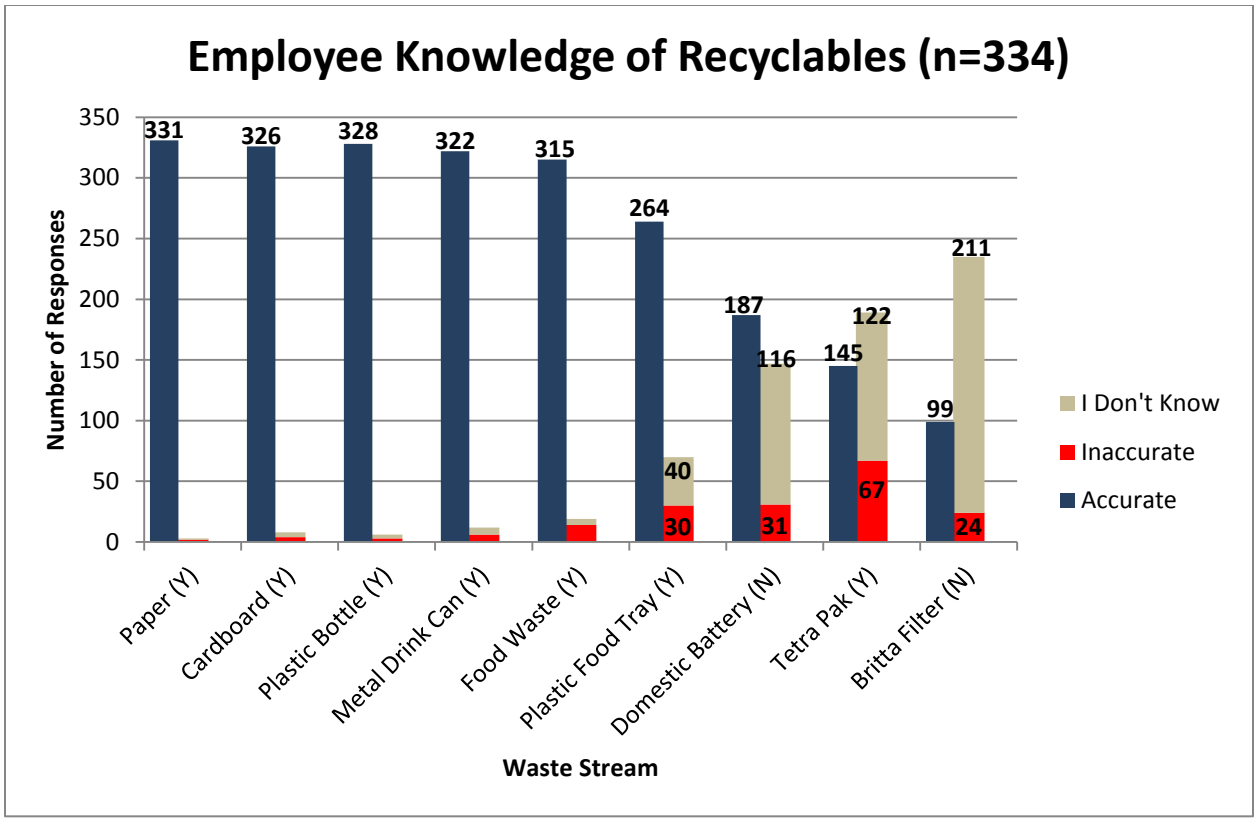

Figure 25: The correct and incorrect responses for the above waste streams in BWH.

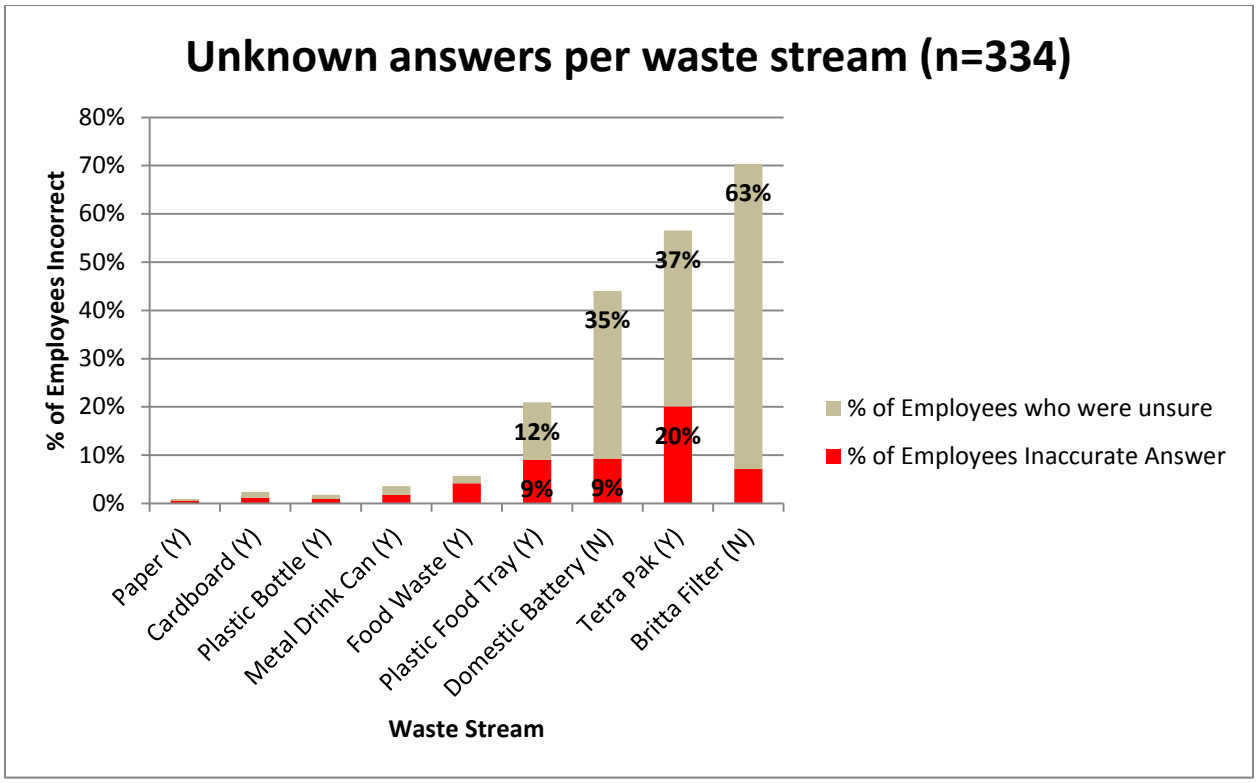

Figure 26: The percent of employees who did not know the correct answer for a waste stream.

Out of the 362 BWH staff who responded to Question #8, 72% (257) reported that they recycled all the time (Figure 27).

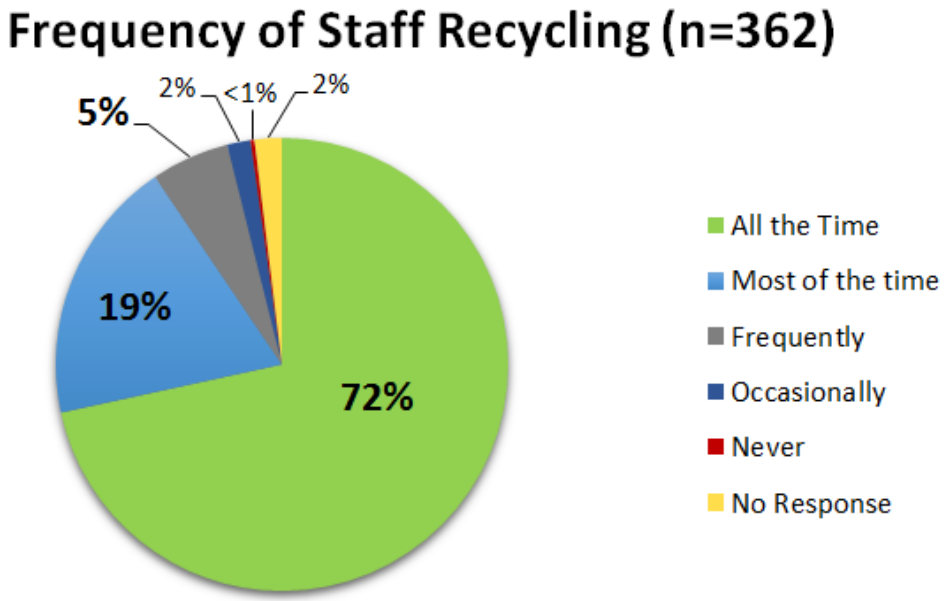

Figure 27: The percentage of employees and how often they recycle

Even among those staff who say the recycle all of the time, Figure 28 indicates that there is a similar trend as noted above in terms of knowledge about recycling. Most respondents know where to place paper, cardboard, plastic bottles, metal drink cans, and food wastes for recycling, but are much less certain about what to do with less common recyclables, such as plastic food trays and tetra packs. Only 13% (33 out of 257) of respondents were able to correctly identify recycling options for the nine items. When the non-recyclable items (batteries and Britta filters) were removed from consideration, the figure increased to 35% of respondents. Figure 29 emphasizes these findings, and demonstrates the need for more education and better labeling.

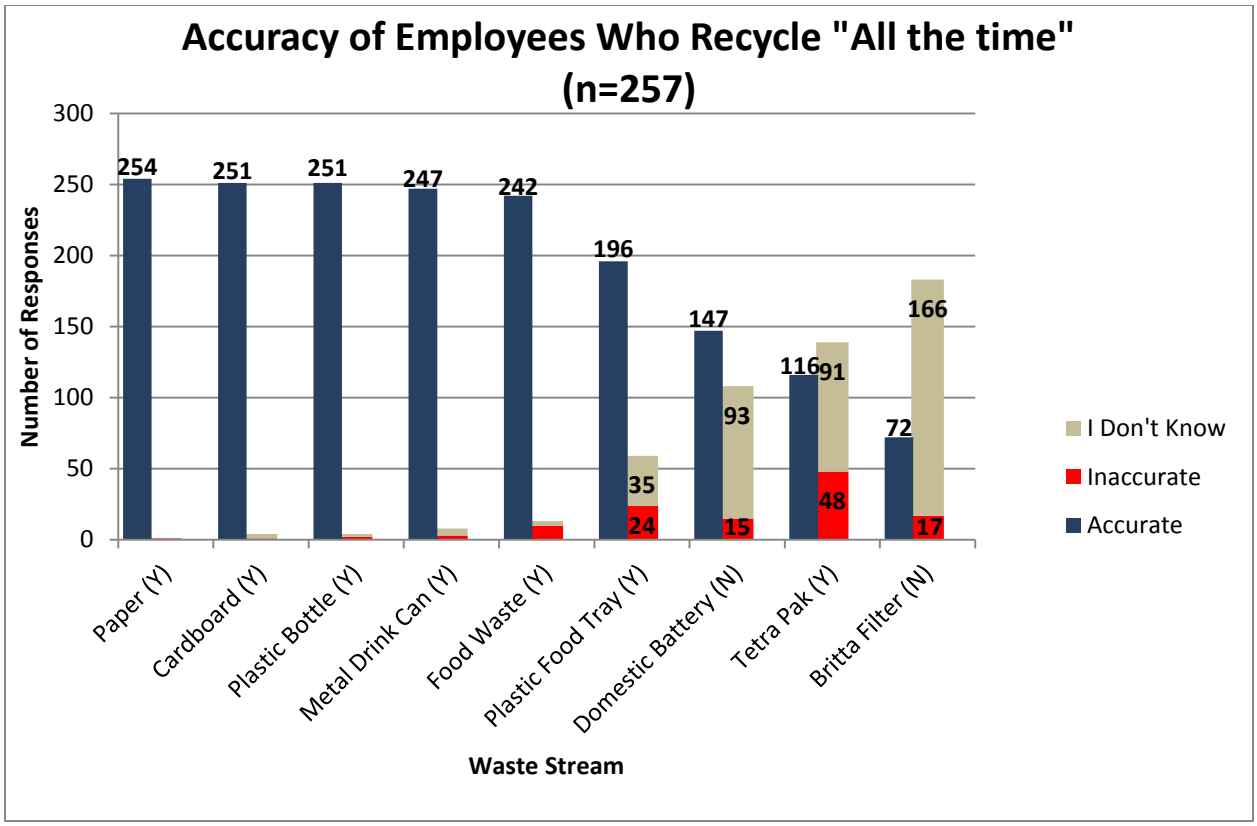

Figure 28: The correct and incorrect responses for the above waste streams in BWH.

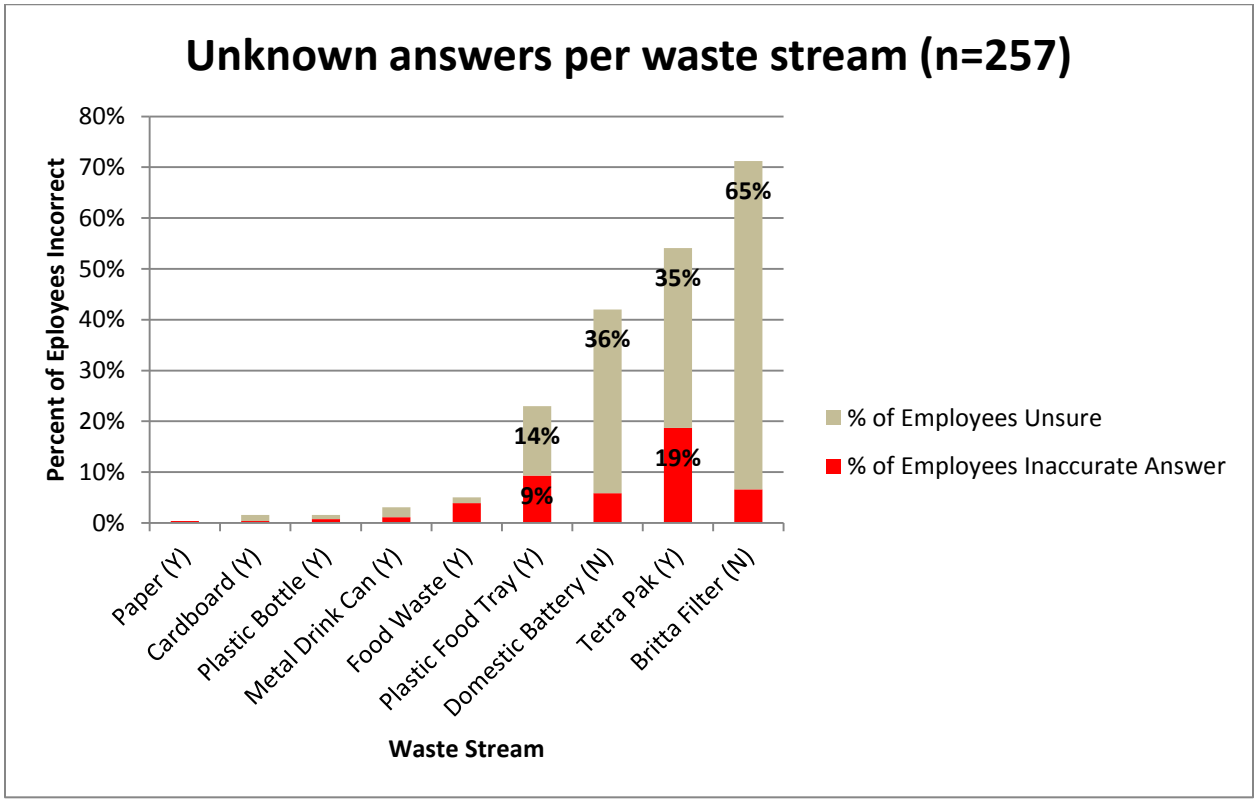

Figure 29: The percent of employees who did not know the correct answer for a waste stream.

As part of the survey, the respondents were asked if they believed the labelling on the bins were clear. As shown in Figure 30, 252 out of 362 respondents believed the bin labeling was clear. With that data, approximately 30% of respondents from the Bernard Weatherill House believed the labels were not clear.

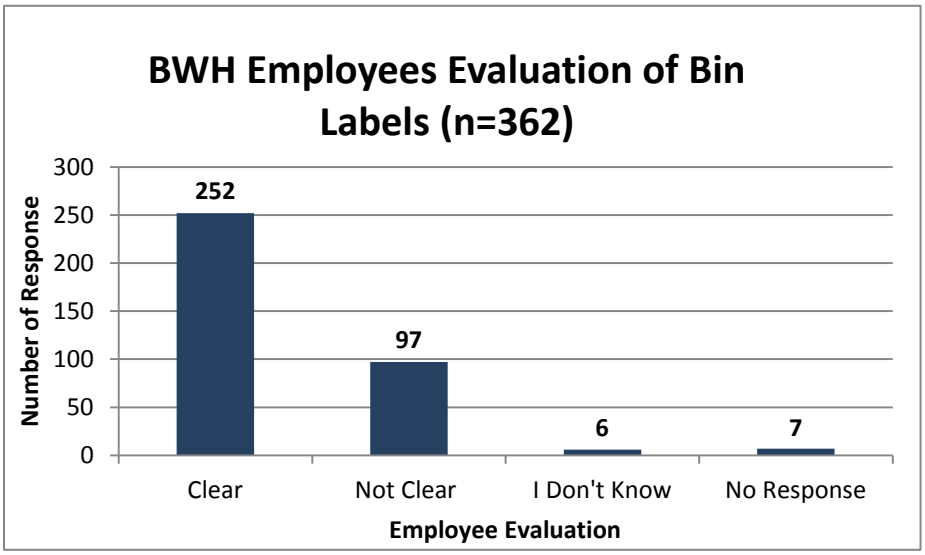

Figure 30: Survey results addressing the clarity of bin labelling

To see if the placement of the bins themselves supported this data, we conducted a waste station label audit, as previously mentioned. The discrepancies in labels have led to confusion about recyclable materials amongst the Croydon Council staff.

The survey included two open-ended questions designed to gather employee opinions about what could be improved regarding the Council's recycling program. Question 11 asked "Please tell us if there is anything you think is not clear and how it can be improved." After coding and sorting all the responses (Figure 31).

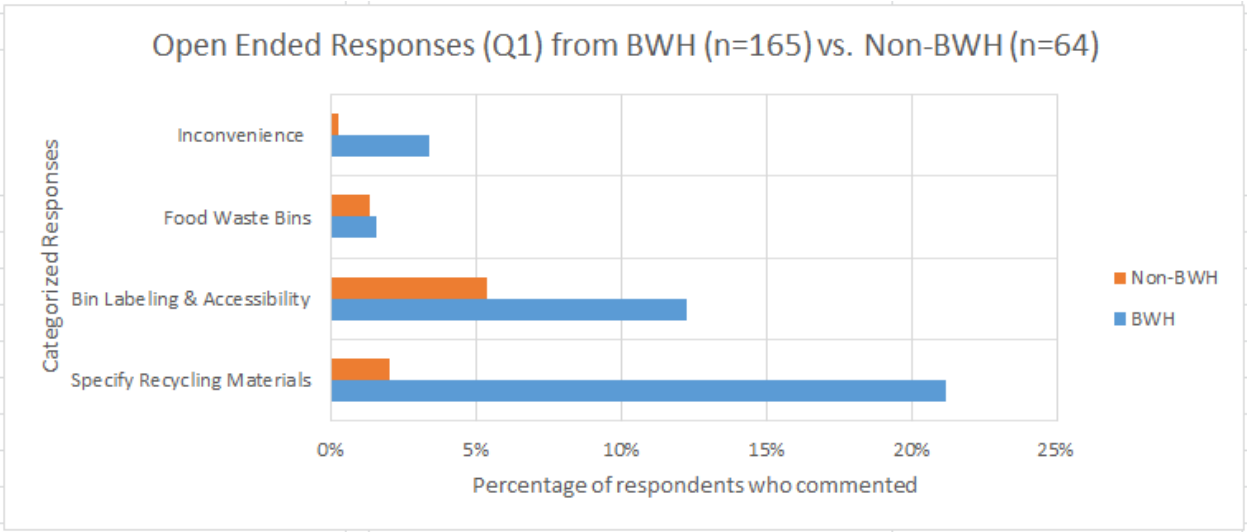

Figure 31: Comments received question 11

The categories were determined based on common themes among responses. Some examples of open responses include, “An accurate list of what can and can’t be recycled”, “The signs are clear it is staff who require more education”, and “There are no separate bins in the area I work in”. Our team analyzed the responses of BWH separately from non-BWH to determine the necessities of the different buildings. Since BWH has already begun improving its recycling program, it is better equipped to recycle effectively than the other buildings. We found the most common answer for respondents who worked in the BWH was “specifying recyclable materials." This adds further to the finding that the labelling is not clear and needs to be improved upon. Members of staff who do not work in the BWH most commonly responded requesting bin labelling and accessibility.

Question 14 asked “What could the Council do to encourage you to recycle more of your waste at work?” Similar to above, the responses were grouped into categories. Recycling participation refers to encouraging employees to recycle through interoffice competitions. Communication involves continuously reiterating a positive recycling message to employees through the use of posters, campaigns, etc. Staff education includes comments about the Council providing information about internal procedures and why recycling is important. Many responses included suggestions on improved labelling to reduce confusion about recyclable materials. The availability and convenience of bins was also mentioned in some responses from both BWH and non-BWH respondents. Figure 32 displays the response categories to this question.

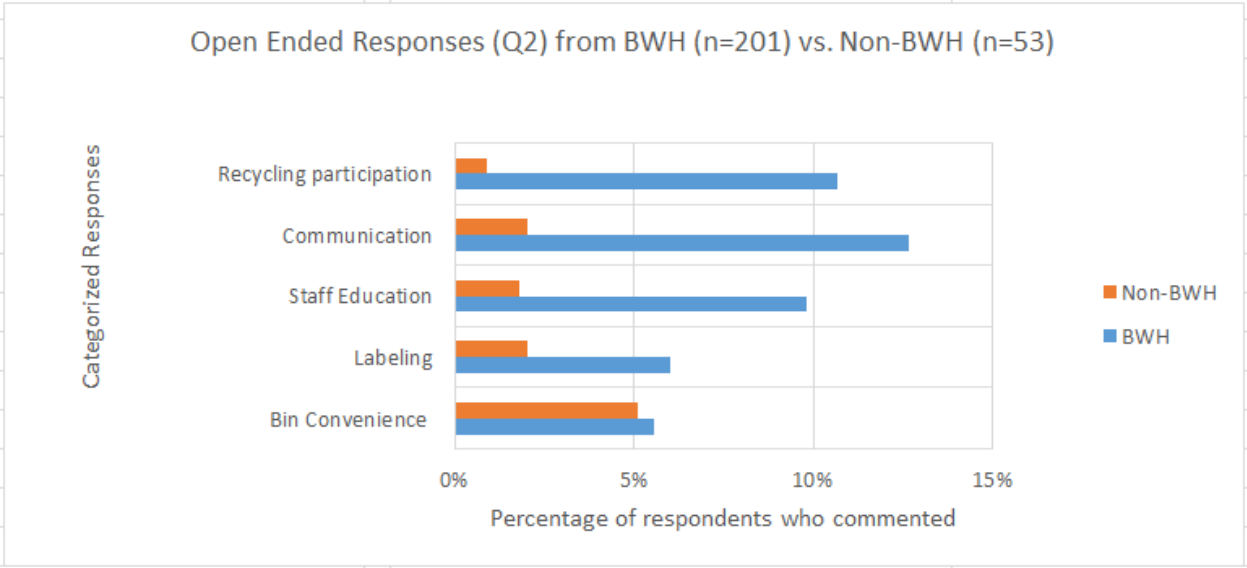

Figure 32: Comments received for Question 14

As seen in Figure 32, a similar number of BWH respondents all desired recycling participation within the Council, communication regarding recycling, and education on why recycling is important. Members of staff who reside outside the BWH again desire better bin convenience as noted in the previous section.

5. Conclusions and Recommendations

As a result of our background research and previously described methodology, our group determined a set of recommendations intended to improve the internal recycling measures and rates of the Croydon Council. The following chapter outlines our major conclusions drawn from our research and describes how the recommendations will benefit the Council. Based on our findings, we divided our recommendations into four major sections: Accessibility, Labeling, Education, and Communication. Within those sections, we categorized the recommendations further into low effort solutions and greater effort solutions. We rated the amount of effort necessary for each recommendation in terms of the cost, time, management, maintenance, and potential risk analysis associated with each task. An overview of our recommendations can be seen below in Table 6.

	Recommendation	Pros	Cons
Low effort solutions	Tipping Container	- Reduce contamination - Cheap	- Health & Safety concerns (spilling/hot liquid, etc.) - Needs to be emptied
	Bins for Octavo	- Easy fix (If extra bins are available)	- Costs money (If bins are not available)
	Improved Labeling	- Less confusion about bins - Reduce contamination	- Costs money to be designed and printed
	Colored Waste Bags	- Less contamination due to incorrect bag placement	- May be more expensive than clear bags
	Education among Council Staff	- Almost priceless - Reduce contamination - Potentially save money	- Requires organization
	(Non)Recyclable-of-the-week	- Cheap - Simple to maintain	- Need a leader
	Communication about improvements	- Cheap - Constant reminders - Increase awareness	- Requires organization
Greater Effort Solutions	Bins for Town Hall/ Clock Tower	- Increase accessibility - Reduce contamination - Reduce landfill waste	- Space constraints - Costs money - Health & Safety risks
	Improved Data Collection System	- Provide figures to employees - Determine baseline - Aware of current rates and improvements	- Requires organization - Continuous maintenance - Need to inform all staff
	Inter-office competition	- Competitive incentive - Increase recycling rates - Positive reinforcement	- Difficult to divide floors - Requires organization
	Recycling Champions	- Cheap - Improves communication	- Requires organization - Need enthusiastic leader - Large time investment
	Compactor	- More recyclables/waste for the same price - Less collections needed	- Expensive - Requires maintenance - Training

Table 6: Table of Recommendations

Accessibility

After speaking with other boroughs and members of staff of the Croydon Council, we found that one of the most important aspects of a productive recycling program is bin accessibility. If the bins are not available for use, the Council cannot effectively promote recycling. The Council oversees many buildings, known as satellite sites, which provide a variety of services for the residents of Croydon. Because the satellite sites create different types of waste, they will require a different demand for recycling bins. Through our analysis of the Bernard Weatherill House and the Town Hall/Clock Tower, we concluded there is not a "one-

size fits all" approach. Thus, we have determined recommendations that aim to increase accessibility for the respective Council buildings.

The Bernard Weatherill House provides bins for four separate waste streams: "Paper & Card", "Bottles & Cans", "Landfill", and "Food Waste". The three large bins are located in the same waste station, and the food waste bins are located in the kitchen for increased convenience. However, our team observed a large amount of contamination resulted from partially full coffee cups being thrown into the "Paper & Card" bin. In order to reduce contamination our team recommends placing a "Liquids" container next to the bins to increase the convenience of emptying a cup or bottle prior to disposal. The tipping container would be a simple, inexpensive way of reducing contamination. The Council would, however, need to look into health and safety concerns that could be associated with its employment. For example, if the bin contains hot liquid and manages to spill on someone, s/he could be injured. The risk of harm could be easily reduced by fastening the container to the counter and putting a warning label on the bin to clarify the bin could contain hot liquids.

The Town Hall/Clock Tower has recently renovated one of the floors and is now renting it out to a Council-run company, Octavo. As a low effort solution, our team recommends targeting this floor as a major point of improvement. Since the employees have moved in very recently, promoting recycling on their floor should be easier, because they are used to the recycling program in BWH. When our team visited, the recycling and waste bins were only in the kitchen area. Since there were no bins in the working areas, employees had to collect the trash and bring it into the kitchen. This could lead to the re-institution of under-desk landfill bins, which would reduce the Council's chance for recycling improvement. In order to avoid hindrance, the Council should investigate the cost of putting bins in Octavo. Even old bins can be reused to help reduce the cost of improving accessibility in the Town Hall/Clock Tower.

Our team also determined that other areas of the Town Hall/Clock Tower do not have proper access to necessary recycling bins. It is important to have bins available to the Council employees because it helps reduce contamination and reduces the amount of landfill waste. Currently in the Town Hall/Clock Tower, recyclable items get thrown into general waste bins because no other bins are easily accessible to employees in certain areas. Due to health and safety concerns, the Council cannot place bins in public areas. As mentioned previously, our team developed a set of maps specifying what waste streams are necessary for different rooms in

the Town Hall. Our team recommends that the Council use these maps to decide where bins will be most effectively deployed. Although there is a cost in getting new bins, it would cost the Council less to recycle this potential waste stream than to dispose of it as landfill waste; thus, the benefits will ultimately outweigh the costs.

Labeling

Through our observations of other organizations' recycling programs, such as LFB, Camden, and Bexley, we determined labeling has a large effect on the success of the system. Well-designed labels help reduce the amount of contamination and also reiterate the recycling message to improve recycling rates. In BWH, the laminated labels on many of the bins have fallen off. Our team recommends that the Council create new labels that clearly identify recyclable items with the use of pictures. Figure 33, below, shows an example of the labeling used at the London Fire Brigade.

Figure 33: Example of labelling from the London Fire Brigade

The colorful pictures and corresponding captions are eye-catching and clearly identify what types of items can be recycled. These labels are made into stickers, which are applied to the front of a bin. Employing sticker labels could help the Council employees better identify which materials go in which bin, and in turn help reduce the amount of contamination due to confusion.

Another observation our team made was that all of the large waste streams are placed in the same clear plastic bags. When the bags are collected, they are placed on the same trolley and brought down to the "Goods-In" room. Although the waste streams should ideally be separated enough for the operatives to tell which bag goes in which bin, large amounts of contamination increase the likelihood of the bag being placed in the wrong bin. As discussed with our interview with Mark Norrell, our team recommends the Council further investigate the cost of having different colored bags for each waste stream. To keep consistency, the "Paper & Card" would be a blue bag, "Bottles & Cans" would be green, and "Landfill" would be red. The colored bags would still be semi-transparent to ensure the operatives could keep track of overly contaminated bags. Additionally, different colored bags would make it easier for operatives to sort the bags appropriately when removing them from the trolley in the "Goods-In" Room. Distinctive colors would also serve as an additional reminder to the staff because seeing the colored bag in the bin would visually identify the waste stream without the operative having to open a bag to confirm its contents. Camden has already implemented this strategy and has found great success in reducing contamination. A visual clarification would help reduce the amount of contamination for the recycling, as well as help reduce the amount of recyclables thrown into landfill waste.

Education

One of the most emphasized techniques across interviewed organizations, particularly in LFB, was the use of education to encourage recycling. Improving education is a simple, inexpensive way to provide the employees with explanations of various recyclable materials. Educating the employees of the Council will help clarify exactly what can be recycled and potentially save the Council money. Since recycling is cheaper than disposing of landfill waste, it is important to not fill up the landfill bin with recyclable materials. Our team recommends the Council provide employees with educational materials, like intranet posts and toolbox talks, which would be easily accessible through the intranet or Council-wide emails. Croydon Council currently has a recycling page on their intranet page; however, it is not easily accessible or as informative as it could be. The current description of the bins that are available to the employees is shown in Figure 34 below.

Figure 34: Current Croydon Council intranet posting

Our team has produced an example of a revised intranet page, as shown in Appendix F. This new description provides captions, as well as pictures of the items that can be placed in each bin. Another way of educating the employees is to have a "Recyclable-of-the-week" and a "Non-Recyclable-of-the-week" posted on the intranet page. These would consist of common items that are either often found in the landfill bin but are recyclable (such as a paper coffee cup), or items that are not recyclable and contaminating the recycling (such as plastic carrier bags). This will help clarify to Council employees what can and cannot be recycled in a unique way. Being creative with messaging keeps the staff actively involved, increasing the likelihood of recycling participation. Educating the employees will help reduce contamination and save the Council money on waste disposal.

Another option for educational materials is distributing items similar to the London Fire Brigade's "Tool box talks", as shown in Appendix E. Our team recommends the Council develop educational sheets that can be distributed to all the Council staff either in department meetings or via email. The info sheets would address the importance of recycling, the benefits of recycling, and suggestions on how to increase recycling rates. Through these sheets, employees would have the opportunity to obtain further insight regarding why recycling improvements matter and how the changes will benefit the Council as well as the rest of the environment as a whole. Although info sheets would require additional organization, increasing employee recycling knowledge will encourage people to recycle properly because they will be aware of the benefits.

Communication

Another crucial technique for having a successful recycling program is communication. This ties in with education because if the employees do not know the educational materials are available, they are not beneficial. From many of the site visits, our team concluded that the most effective form of communication is utilizing multiple forms of media for continuous reminders. This was particularly evident in Kingston during their switch-off campaign. It is important to have a simple, straight-forward message, which can be reiterated in multiple venues to emphasize the importance of the message.

There are multiple, low-effort recommendations the Council could use to improve the communication and promotion of internal recycling. First, if changes or improvements are made to the current recycling system, our team recommends that the Council inform the staff of all changes prior to implementation. This allows employees time to become aware of the new improvements before changes are made, and prior knowledge will reduce confusion when the changes are officially put into action.

Our team has also concluded that the more times employees are reminded of recycling, the more the likelihood of them recycling properly increases. Bexley strongly emphasized communicating the importance of recycling by utilizing many promotional posters to increase the emphasis on recycling within the Croydon Council, our team recommends creating posters, table tents, and media displays. Our team has developed initial designs, as shown in Appendices G and H, which promote a positive recycling message and encourage internal recycling. Having

a concrete communication system will help to ensure that all the employees are made aware of the internal recycling practices and to encourage staff to be more mindful of recyclable items.

Our team has also developed some recommendations for communication that require more effort, including collecting data on recycling rates, analyzing and publishing results, and creating inter-office competitions. Many of the organizations we spoke with, such as Bexley and LFB, had a lot of success publishing recycling percentages and the amount of progress certain areas of the building were doing. The current data collection system at the Croydon Council is ambiguous; consequently, it is difficult to get an accurate approximation for how much the Council is recycling. Our team recommends that the Council work with Interserve operatives to develop a more accurate method of measurement. Having accurate data will allow the Council to publish the progress made; and, in turn, employees will be able to see the benefits that the improvements are making on recycling rates and in the context of environmental impact. Once a new system is put into place, the Council would have the opportunity to hold inter-office competitions. With an improved data collection system, the Council would be able to track how much and how well certain zones of the building are recycling. This recommendation would require a significant commitment of organization and time, however, it has proven to be beneficial in other organizations, such as Bexley and the London Fire Brigade. Our team believes implementation of this recommendation will provide an opportunity to improve recycling rates, as well as positive feedback, for the Croydon Council.

Recycling Champion

As a way to help inform the employees, we recommend reinstating the existing Recycling Champions Network that has become dormant. The Recycling Champions Network has proven to be extremely successful in other boroughs, including Camden, Bexley, Kingston, and Sutton. Moreover, prior to budget cuts, the network was previously successful for the Croydon Council. Although reinstating the Recycling Champions Network will require a lot of organization and a sense of leadership, our team strongly believes the benefits will exceed the start-up efforts.

Similar to how the program worked previously, the network would consist of volunteers who are passionate about recycling and willing to encourage their colleagues to help improve recycling within the Croydon Council. The champions could be used as intermediates for distributing educational information from management to the rest of the staff. In order to reduce

the amount of time utilized for meetings, our team recommends the program coordinate with the members who attend the building user forum every month. A small portion of the agenda could address recycling issues and help clarify any employee concerns. The recycling champions would be able to attend this forum and distribute any additional information to their colleagues via email.

Waste Compactor

Based on our findings, our team also recommends the Council further investigate the use of a compactor on site. As previously mentioned, Bexley found great success in compressing their recyclable and landfill waste, which resulted in large savings for the Council. The use of a compactor depends largely on the outline and criteria of the waste management contract agreed upon by the Council. Our team recommends the Croydon Council look into the specifics of the waste contract to gain further understanding of how the waste is collected and paid for. From this information, the Council will be able to determine how much of a cost benefit the compactor will provide. Trash compactors, however, require a large amount of maintenance and time for training operatives on its use. Such large machinery can be dangerous so it is important for the Council to ensure safety procedures are well known and always followed. Although compactors require a great deal of effort, our team believes this solution could result in large savings for the Council. Our team has conducted initial research into the cost and maintenance associated with on-site compactors. The expected life of a trash compactor is 10 years (Appliance Life Expectancy, n.d.). According to an RS Means cost analysis completed by Oregon State University a trash compactor will take 3.6 years-time to payback the initial investment cost (Oregon State University, 2012). A trash compactor will reduce the volume of the waste and ultimately reduce the cost by lowering the number of waste collections required. Our team recommends the Council investigate the costs associated with compactors in the United Kingdom.

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Appendix A: Semi-Formal Interview Script

[Insert Greeting]

We are [state names] and we are students from Worcester Polytechnic Institute in Worcester, Massachusetts. Our project involves conducting research in cooperation with the Croydon Council to evaluate current, in-house recycling practices and develop a strategy to recommend revised, more efficient policies and guidelines.

We would like to inform you that this interview is voluntary and you may refuse to answer any question at any time and may stop the interview at any point, temporarily or permanently. Also, one team member [state name] will be taking notes during the interview if that is okay with you.

We would like your permission to quote any statements made during this interview. If preferable, we can use a pseudonym or keep your identity confidential. Also, if quoted, you will be given the right to review our report prior to publication.

Questions are categorized and not everyone was asked in every interview.

Is recycling compulsory in your borough?
Is recycling actively encouraged to your staff/building users?
Approximately what percentage of your staff live in your borough?
Is your messaging to staff the same as residents?

What can you recycle in your offices?
Is it consistent across all sites?
Is the same in the public areas of your buildings?
Do you mix printer paper with general paper/cardboard?
Do you have any additional recycling hubs in your offices for items like domestic batteries?

Who collects recycling within your offices, is it Council officers or a contractor.
Do you have a waste collection contract for businesses in the borough? If so is your commercial waste/recycling collected by this contractor.
Does one collector collect all waste streams, or do you have separate contractors for different waste/recycling streams. Please explain.
Do you measure waste/recycling? How? Is it measured by volume/weight?
Do you have a recycling target?
Are you happy to share you recycling rate?
Do you put a financial value on reducing waste/increasing recycling? How is this calculated?
Do you break down information to different areas/floors?
Do you publish information to staff?

Which of these types of project/campaign have you done? Can you share information/materials?

- Improved signage on bins
- Poster Campaigns

- Intranet/email campaigns
- Voluntary Training
- Compulsory Training
- Anything else?

Has there been any major successes (or failures)?
Do you set targets for campaigns? How are the targets set? How are they monitored?
Is success measured in ways other than volumes recycled?

Do you carry out any surveys to find out what staff think about recycling at work / your recycling facilities?

Possible Issues with messaging.
Having a campaign where different office have access to different facilities.
Having a complicated message to try and maximise recycling vs a simple message

Do you have recycling champions? What is their role?
Do you offer any incentives for staff/champions?

Do you have major issues with contamination of recycling in your office?
How do you deal with these?

Do you ask staff to break down boxes?
Do you compress waste/recycling?
Do you try and reduce the amount of paper that goes into confidential waste (and into paper recycling)?

What Information can you share?
Would you like to come to our final presentation?

Appendix B: Preliminary Contact (E-mail)

Greetings [name of interviewee],

My name is [team member] and I am part of a student project team from Worcester Polytechnic Institute located in Worcester, Massachusetts. My team is currently working with the Croydon Council to evaluate current recycling practices and develop a strategy to recommend revised, more efficient policies and guidelines. We are very interested in interviewing you about the current recycling practices within your office. We have chosen to interview you specifically based on [insert reasoning for the involvement of selected interviewee]. We are also keen on receiving feedback regarding how recycling in the Croydon Council can be improved. We appreciate your time and willingness to contribute to our research, and will keep the interview to approximately 30 minutes. Please let us know at your earliest convenience if you are willing to meet with us. We look forward to hearing from you.

Thank you,
[Team member]

If the contact responds “yes” we will follow up with a phone call to schedule an interview time and place and indicate we would prefer a face-to-face discussion. If the contact responds “no” we will ask him/her to refer us to an additional contact.

Appendix C: Staff Recycling Survey

We are asking for your help to understand whether recycling is working well at Croydon and how we can improve it. Please tell us where things are not working well. We value your feedback and your response will help us make recycling easier. Please circle your answers.

1. Do you live in the London Borough of Croydon?

   Yes No

2. What percentage of domestic waste in Croydon do you think is currently being recycled?

0% - 9%	10% - 19%	20% - 29%	30% - 39%
40% - 49%	50% - 59%	60% - 69%	70% - 79%
80% - 89%	90% - 100%		

3. Which office do you work in most of the time, or is your team based in?

4. (Only if you work in the Bernard Weatherill House) Which floor do you work on or is your team situated?

5. What percentage of office waste in your building do you think is currently being recycled? Guess if you are unsure.

0% - 9%	10% - 19%	20% - 29%	30% - 39%
40% - 49%	50% - 59%	60% - 69%	70% - 79%
80% - 89%	90% - 100%		

6. Do you know what you should put in each of the recycling bins in your office (if there are any)?

   Yes No I don't know

7. For each of the items below, please let us know if you can recycle them in your office. Check the box that applies to each item.

	Yes	**No**	**I Don't Know**
Printer Paper			
Cardboard			
Plastic Bottle			
Plastic Food Tray			
Domestic Battery			
Tetra Pak			
Metal Drink Can			
Britta Filter			
Waste Food			

8. How often do you separate your waste into available recycling bins at work?

   Never Occasionally Frequently Most of the time Always

9. Do you think the labelling on recycling bins in your office is clear?

   Yes No I don't know

10. Please tell us if there is anything you think is not clear and how it can be improved.

11. Is there anything you would like to be able to recycle in your building (which you cannot currently recycle)?

12. Do you think the Council should do more to educate staff on the reasons for recycling?

    Yes No I don't know

13. Do you think the Council should inform staff about how much waste we are recycling?

Yes No I don't know

14. What could the Council do to encourage you to recycle more of your waste at work?

15. If you have any further comments about recycling in the Council please use the space below.

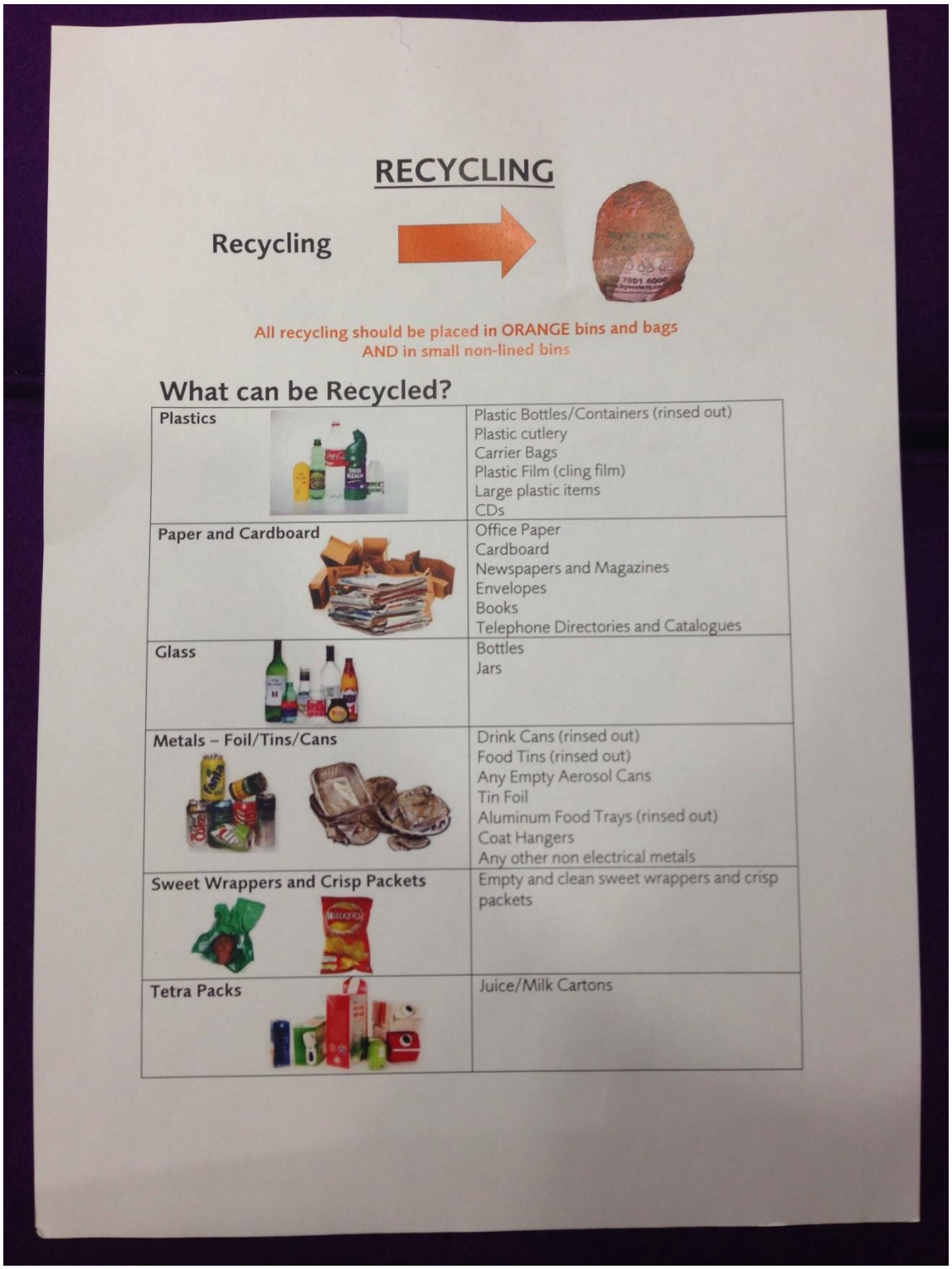
16. A group of students will be carrying out a project on recycling in Council Buildings during March and April. Are you happy to be contacted by them?

Yes No

17. If you answered yes to question 16, please provide your name and contact details below.

Thank you for taking your time to complete this survey.

Appendix D: London Fire Brigade Waste Bin Information Sheets



RECYCLING

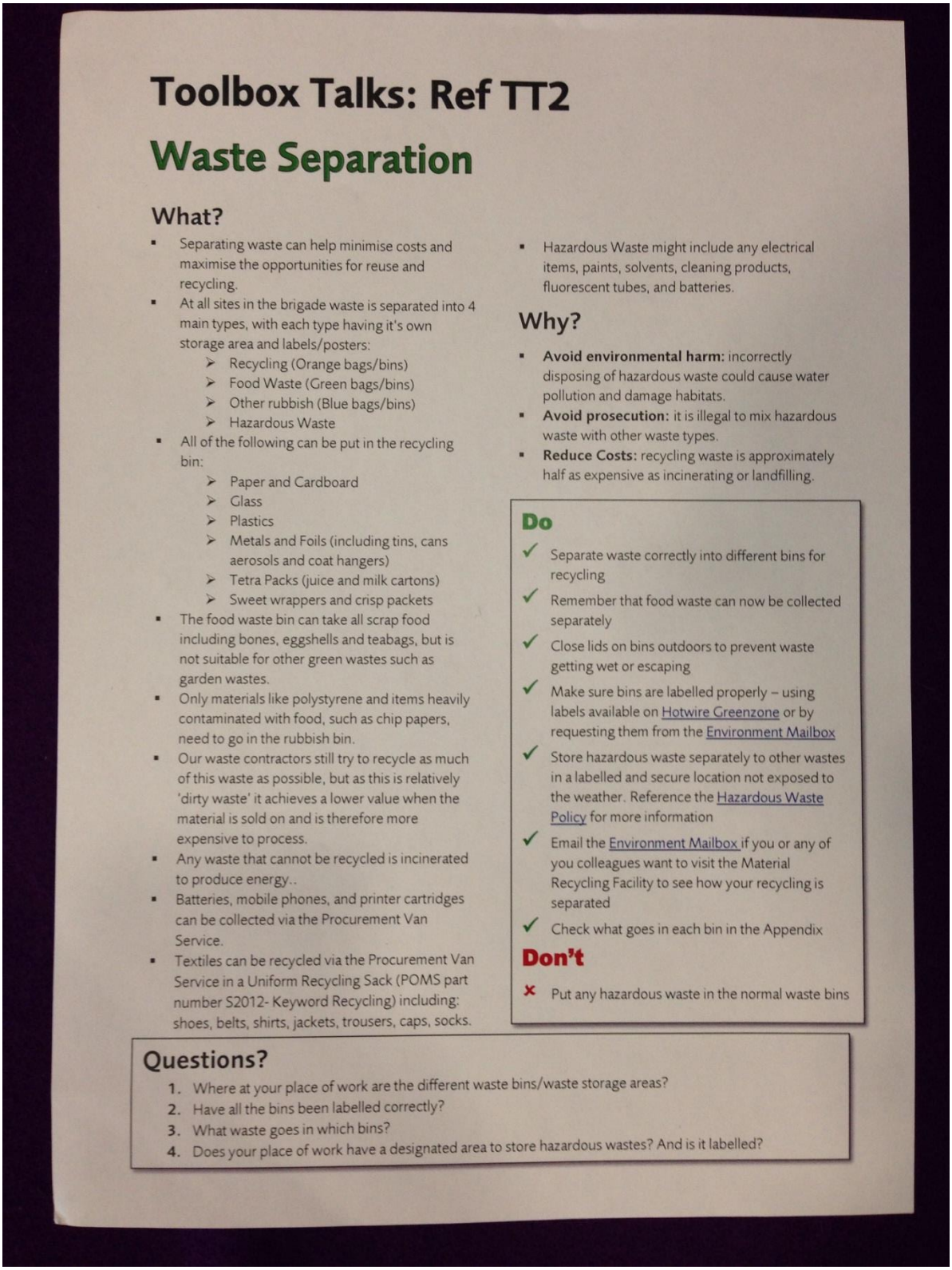
Recycling

All recycling should be placed in ORANGE bins and bags
AND in small non-lined bins

What can be Recycled?

Plastics	Plastic Bottles/Containers (rinsed out) Plastic cutlery Carrier Bags Plastic Film (cling film) Large plastic items CDs
Paper and Cardboard	Office Paper Cardboard Newspapers and Magazines Envelopes Books Telephone Directories and Catalogues
Glass	Bottles Jars
Metals – Foil/Tins/Cans	Drink Cans (rinsed out) Food Tins (rinsed out) Any Empty Aerosol Cans Tin Foil Aluminum Food Trays (rinsed out) Coat Hangers Any other non electrical metals
Sweet Wrappers and Crisp Packets	Empty and clean sweet wrappers and crisp packets
Tetra Packs	Juice/Milk Cartons

Appendix E: London Fire Brigade Tool Box Talks



Toolbox Talks: Ref TT2

Waste Separation

What?

- Separating waste can help minimise costs and maximise the opportunities for reuse and recycling.
- At all sites in the brigade waste is separated into 4 main types, with each type having it's own storage area and labels/posters:
  - Recycling (Orange bags/bins)
  - Food Waste (Green bags/bins)
  - Other rubbish (Blue bags/bins)
  - Hazardous Waste
- All of the following can be put in the recycling bin:
  - Paper and Cardboard
  - Glass
  - Plastics
  - Metals and Foils (including tins, cans aerosols and coat hangers)
  - Tetra Packs (juice and milk cartons)
  - Sweet wrappers and crisp packets
- The food waste bin can take all scrap food including bones, eggshells and teabags, but is not suitable for other green wastes such as garden wastes.
- Only materials like polystyrene and items heavily contaminated with food, such as chip papers, need to go in the rubbish bin.
- Our waste contractors still try to recycle as much of this waste as possible, but as this is relatively 'dirty waste' it achieves a lower value when the material is sold on and is therefore more expensive to process.
- Any waste that cannot be recycled is incinerated to produce energy..
- Batteries, mobile phones, and printer cartridges can be collected via the Procurement Van Service.
- Textiles can be recycled via the Procurement Van Service in a Uniform Recycling Sack (POMS part number S2012- Keyword Recycling) including: shoes, belts, shirts, jackets, trousers, caps, socks.
- Hazardous Waste might include any electrical items, paints, solvents, cleaning products, fluorescent tubes, and batteries.

Why?

- **Avoid environmental harm:** incorrectly disposing of hazardous waste could cause water pollution and damage habitats.
- **Avoid prosecution:** it is illegal to mix hazardous waste with other waste types.
- **Reduce Costs:** recycling waste is approximately half as expensive as incinerating or landfilling.

Do

- ✓ Separate waste correctly into different bins for recycling
- ✓ Remember that food waste can now be collected separately
- ✓ Close lids on bins outdoors to prevent waste getting wet or escaping
- ✓ Make sure bins are labelled properly – using labels available on Hotwire Greenzone or by requesting them from the Environment Mailbox
- ✓ Store hazardous waste separately to other wastes in a labelled and secure location not exposed to the weather. Reference the Hazardous Waste Policy for more information
- ✓ Email the Environment Mailbox if you or any of you colleagues want to visit the Material Recycling Facility to see how your recycling is separated
- ✓ Check what goes in each bin in the Appendix

Don't

- × Put any hazardous waste in the normal waste bins

Questions?

1. Where at your place of work are the different waste bins/waste storage areas?
2. Have all the bins been labelled correctly?
3. What waste goes in which bins?
4. Does your place of work have a designated area to store hazardous wastes? And is it labelled?

Appendix F: Proposed Intranet Post

PAPER & CARD

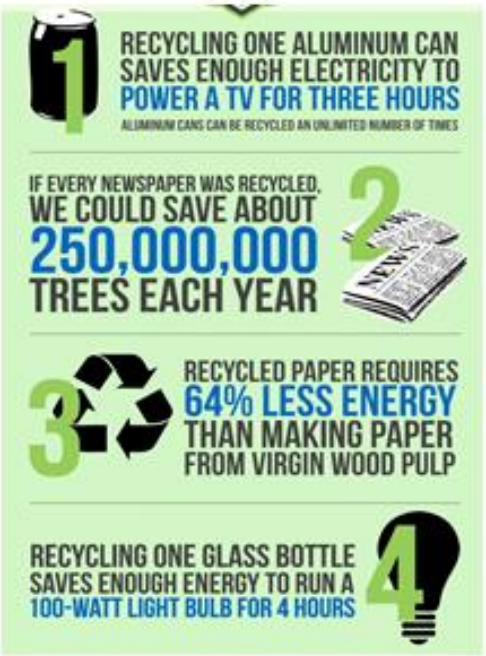
Waste

Cardboard **(preferably broken down)**	
Paper, Magazines, Newspaper	
BWH Café Coffee Cups/ **Coffee Cup Holders**	
Holiday Cards/ Envelopes	
Paper Towels **(blue or white kitchen towels)**	

Appendix G: Proposed Table Tents

Front

Back



Front

Back

Front

WHY RECYCLYE?

Recycling reduces pollution

Greenhouses gases from landfills pollute the ozone. Recycling reduces these harmful effects.

Saves expenses and resources

It costs the Council more to dispose of landfill waste than recyclable materials.
Recycling more saves the Council money!

Back

WHY RECYCLYE?

Conserves raw materials

Making products out of recycled materials reduces the need to consume natural resources.

Food waste improves soil

Composting helps suppress plant diseases and eliminates the need for chemical fertilizers!

Appendix H: Proposed Poster Campaign