

**Towards Achieving Zero Waste at UBC: Food Service Ware**

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## EXECUTIVE SUMMARY

Single-use food service ware is often disposed in landfills, incinerators or the world's oceans where it can cause numerous adverse effects to the environment and humans. These adverse effects include depletion of non-renewable resources, introduction of toxic chemicals into the environment, generation of air and water pollutants, and contribution to climate change. To mitigate these impacts, many municipal governments are developing policies, which increase the use of recyclable and compostable food service ware, and aim to divert the majority of food service waste to either composting or recycling facilities. As a result, institutions need to transition from using conventional food service ware to either reusable options or compostable and recyclable products. The University of British Columbia's (UBC) Point Grey campus, located in Metro Vancouver, is a prime example of an institution in the midst of this transition. Currently within UBC's waste disposal system, there is significant cross contamination between its composting and recycling streams and it is striving to improve the source separation of waste. This study determined what compostable and recyclable food service ware products UBC should provide to its consumers to make waste sorting more efficient and decrease contamination in the campus waste collection system.

Across the campus, the majority of food service ware types are either compostable or recyclable. Straws should be thrown into the garbage because they are made of unmarked plastic. Other food service ware types that were identified as garbage include: unmarked plastic cutlery, biodegradable plastics, composite paper and plastic products, aluminum-lined sleeves and sandwich toothpicks lined with cellophane. Targeted spot audits at Sort it Out stations determined that the mean percentage of item types correctly sorted across the campus was 63%. The AMS Nest, Sauder Exchange Café and Vanier Residence Dining Hall had correct sorting rates of 50% or lower. The items that were most commonly sorted incorrectly were: coffee cups, coffee cup lids, coffee cup sleeves, paper sleeves, compostable take-out containers, chequered food wrapping paper, compostable Nature bowl, recyclable Nature bowl lids and soiled napkins. Up to 98% of the waste analyzed during the spot audits was from the main campus.

In response to the findings from the food service ware surveys and targeted spot audits, a food service ware management plan was recommended to improve waste sorting at UBC's Vancouver campus over the next two years. The plan has the following goals:

1. Make service policies
2. Increase the use of reusable/washable ware wherever possible and increase the breadth of compostable materials on campus
3. Increase awareness and competence of correct waste sorting practices
4. Test compostability of new and prospective products
5. Monitor waste sorting practices on campus
6. Develop and implement a proper documentation and data management system

UBC will accomplish its target of diverting 80% of its waste by the year 2020 through the achievement of these goals and the release of the food service ware procurement guidelines adapted through this project.

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## **LIST OF ACRONYMS**

AMS	Alma Mater Society
ASTM	American Society for Testing and Material
BPI	Biodegradable Products Institute
EPS	Expanded Polystyrene
ISO	International Organization for Standardization
LCA	Life Cycle Assessment
PHA	Polyhydroxyalkanoate
PHB	Polyhydroxybutyrate
PLA	Poly Lactic Acid
QSR	Quick Service Restaurant
SBC	Sustainable Biomaterials Collaborative
SHHS	Student Housing and Hospitality Services
SOP	Standard Operating Procedure
SUB	Student Union Building
UBC	University of British Columbia



## **1.0 INTRODUCTION**

Disposable food service ware (i.e. paper plates, take-out containers, bowls, cups and cutlery) is important in the Quick Service Restaurant (QSR) or fast food industry. It allows QSRs to efficiently serve their clientele and provides consumer convenience, minimal maintenance and reduced dishwashing needs. However, these single-use products are often disposed in landfills, incinerators or the world's oceans where they can cause multiple adverse effects to the environment and humans. These adverse effects include depletion of non-renewable resources, introduction of toxic chemicals into the environment, generation of air and water pollutants, contribution to climate change and contamination of food from leaching chemicals (Health Care Without Harm, 2010). These concerns have pushed many municipal governments to develop policies, which increase the use of recyclable and compostable food service ware, and aim to divert the majority of QSR waste to either composting or recycling facilities. As a result, institutions have had to transition from using conventional food service ware to either reusable alternatives or compostable and recyclable products.

### **1.1 Metro Vancouver**

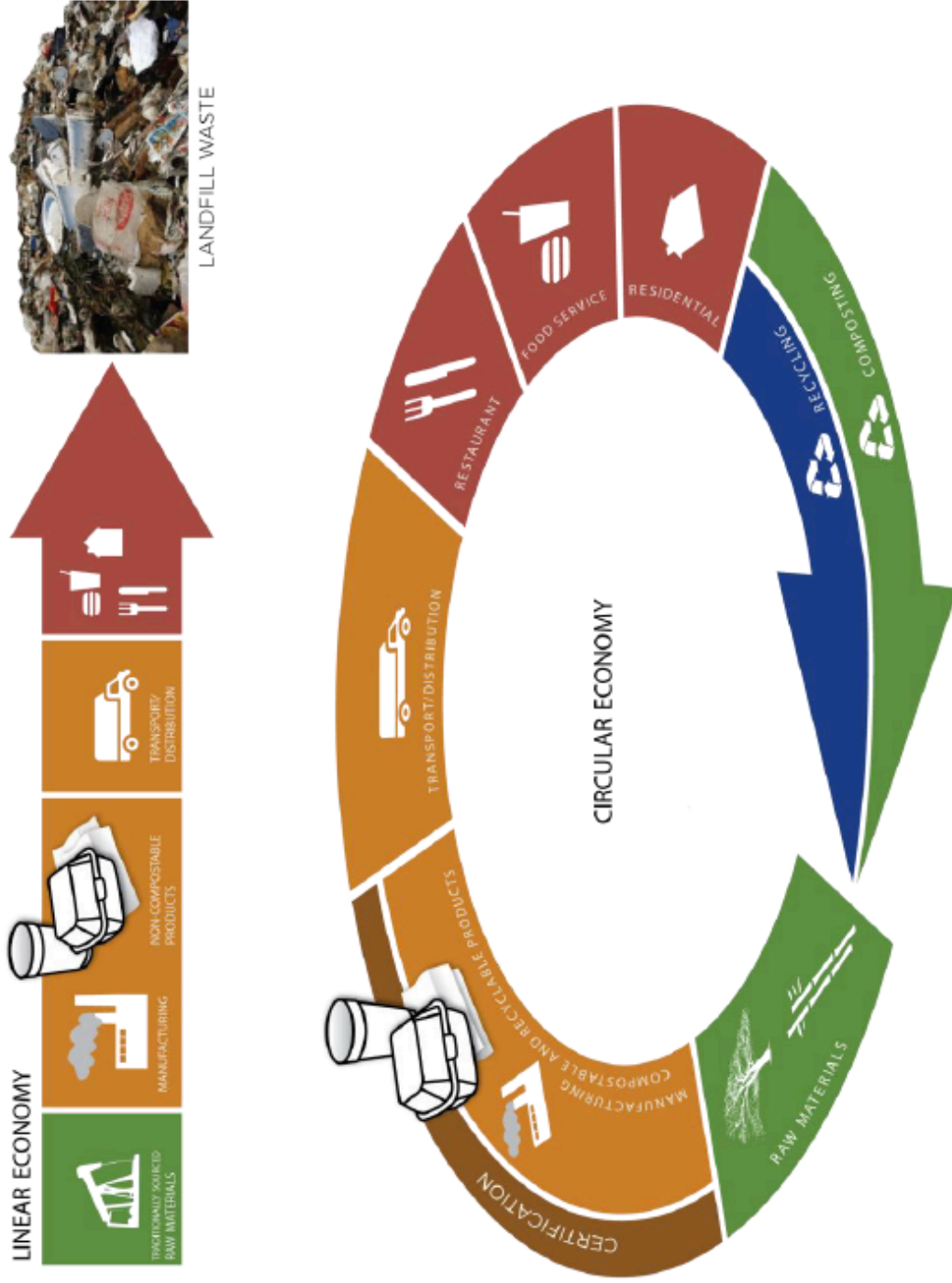
Metro Vancouver (formally the Greater Vancouver Regional District) is committed to creating a sustainable and liveable region for both its residents and businesses. Since the late 1980s, Metro Vancouver and its member municipalities have operated municipal residential recycling programs, municipal recycling depots, backyard compost bin distribution, yard waste collection, disposal bans, and other waste management efforts in the residential, institutional and commercial sectors (Garden Heart Productions, 2012). In addition, Metro Vancouver provided significant feedback to the provincial Ministry of Environment as they developed many extended producer responsibility programs. Currently, the Metro Vancouver region disposes of over a million tonnes of garbage per year, and food along with other compostable organics comprises of approximately over 250,000 tonnes per year. The food services (restaurants, cafeterias, caterers, etc.) and retail food sectors (including supermarkets and corner stores) are the largest commercial generators of food waste in the Lower Mainland (Metro Vancouver, 2014).

As diverting all food waste from municipal landfills is a key component in increasing the region's recycling rate from 55% to 70%, Metro Vancouver initiated and enforced a food waste disposal ban from landfills starting on January 1<sup>st</sup> 2015. While this created a clear policy regarding plate scrapings and general fruit, vegetable, meat and dairy waste, there was ambiguity as to how food service ware and food-soiled paper would be included in the disposal ban. To help resolve confusion involving food service ware and food-soiled paper, Metro Vancouver prudently formed a Food-Soiled Paper Task Group in the fall of 2013 to discuss the logistics of incorporating food service ware and food-soiled paper into the organic waste disposal ban. This task group ensured that the entire restaurant and compostable food service ware supply chain was represented, including small and large businesses. It considered perspectives from compostable food service ware manufacturers, certifiers, distributors, property managers, waste haulers, organics processors, and end

users. Metro Vancouver engaged food service, restaurant and retail food sectors through interactive workshops to identify solutions, build capacity, and shift practices to support the diversion of food waste from landfills within the region (Metro Vancouver, 2014).

Metro Vancouver is striving to support a more circular economy, where resources are used for as long as possible, the maximum value is extracted from them while in use, and materials are recovered to develop regenerated products at the end of an initial product's life. This is dichotomous to the linear economy, in which raw materials are extracted, products are produced, used for minutes or years, and then disposed in a landfill. It is widely accepted that the linear economic system wastes resources, exceeds the Earth's carrying capacity, and causes environmental damage. Figure 1 portrays the linear and circular economies as it applies to food service ware. Metro Vancouver considers its current economic system as a blend of both economic models that is transitioning from purely linear to circular. A more circular economy will yield the following benefits: waste reduction, more use from resources and products, solutions for resource security and scarcity issues, and reduction of negative environmental impacts associated with production and consumption (Metro Vancouver, 2014). As the circular economy is an idealized model, even the most efficient reflection of this concept will not be 100% efficient. Inevitably, there will be some waste material that cannot be recycled or composted, and would be most suitably disposed through energy recovery facilities or landfills.

# DISPOSABLE FOODWARE SYSTEMS



**Figure 1** – Linear and circular economies. Metro Vancouver is striving to support a more circular economy, where resources are used for as long as possible, the maximum value is extracted from them while in use, and materials are recovered to develop regenerated products at the end of an initial product’s life (Metro Vancouver, 2014).

## 1.2 The City of Vancouver

In 2009, the City of Vancouver launched its Greenest City 2020 Action Plan to engage citizens in building a strong local economy, vibrant and inclusive neighbourhoods, and a city on the leading edge of urban sustainability. The plan encompasses 10 goals that aim to minimize residents' ecological footprints and address other environmental issues. The fifth goal is to 'create zero waste'. To achieve this goal, the city has set a target to reduce solid waste going to the landfill or incinerator by 50% from 2008's levels (City of Vancouver, 2012). In 2008, Vancouver was disposing 480,000 tonnes of solid waste via landfill or incinerator per year and in 2013, that number was reduced by 18% to 394,600 tonnes per year (City of Vancouver, 2015). Figure 2 shows the progress Vancouver has made from 2008 to 2013 in solid waste reduction. The city has achieved its waste reduction through the following strategies: collaborating with Metro Vancouver to nurture a zero waste culture through community engagement programs; capturing compostables, and diverting recyclable paper, glass, metal and plastics from landfills and incinerators; and fostering the closed-loop economy that the region is moving towards (City of Vancouver, 2012).



**Figure 2** – The City of Vancouver's progress in reducing its 2008 landfill and incinerator disposal rate by 50% by the year 2020 (City of Vancouver, 2015).

## 1.3 The University of British Columbia

### 1.3.1 The University of British Columbia's waste system

The University of British Columbia (UBC), which is over 400 hectares in size, is located on the west coast of Vancouver. With approximately 52,700 students, and 15,200 faculty and staff, the campus prioritizes continually improving its economic, environmental and social sustainability (UBC News, 2016). UBC is minding its ecological footprint through effective energy and water consumption, transportation management, green building design, environmentally sound laboratory maintenance, sustainable food systems, a zero waste action plan and multiple green research initiatives (UBC Sustainability, 2016).

UBC sends approximately 3,000 tonnes of waste to disposal while recycling and composting approximately another 3,000 tonnes of material (UBC Campus and Community Planning, 2014). In congruence with the regional and municipal waste reduction goals, UBC's Zero Waste Action Plan set waste diversion goals of 60% by 2016 and 80% by 2020. To achieve these goals, the campus has implemented its Sort it Out program to enable waste sorting. Since 2013, UBC has replaced 473 solo garbage cans with 199 sorting stations throughout the main campus both inside buildings and outdoors. These sorting stations include bins for food scraps and other compostable items, recyclable containers, recyclable paper and garbage (UBC Sustainability, 2015). Please refer to Figures 3 and 4 for pictures of UBC's outdoor and indoor sorting stations, and Figure 5 for a disposal guide that corresponds to each of the four sorting streams at Sort it Out stations.



**Figure 3** – UBC's sorting stations, which are situated outdoors throughout the campus. The four waste streams are food scraps/compostable items, recyclable containers, recyclable paper and garbage (UBC Sustainability, 2015).



**Figure 4** – UBC’s sorting stations, which are situated in buildings throughout the campus. The four waste streams are food scraps/compostable items, recyclable containers, recyclable paper and garbage (photo taken during project).

UBC Waste Management regularly empties the compost, recyclable paper, recyclable containers and garbage bins at the Sort it Out recycling stations throughout the main campus, and collects waste from all campus residences. Cardboard, bottles, cans, paper and other plastic products are transported to Metro Materials, where they are repurposed into recycled commodities. Garbage and non-recyclable items are sent to the Vancouver Transfer Station (UBC Building Operations, 2016b). All of the organic waste generated at UBC is sent to the in-vessel compost unit located south of the main campus creating a closed loop system. UBC’s compost program aims to transform all pre-consumer food waste (raw fruit and vegetable scraps), post-consumer waste (cooked fruit and vegetable scraps, as well as meat and dairy products), paper plates, paper cups, paper towels, napkins, and landscaping green waste into a useful soil product for campus gardeners and university landscapes (UBC Building Operations, 2016a). The in-vessel composter does not process compostable or biodegradable plastics.

# Sort it Out.

<p><b>Food Scraps</b></p> <ul style="list-style-type: none"> <li>Cooked food waste</li> <li>Raw fruit, vegetables &amp; grains</li> <li>Paper towels &amp; napkins</li> <li>Bones &amp; egg shells</li> <li>Dairy products</li> <li>Compostable plates</li> <li>Compostable food containers</li> <li>Coffee grounds &amp; filters</li> <li>Tea bags</li> <li>Wood chopsticks</li> </ul> <p><b>Keep Out</b></p> <ul style="list-style-type: none"> <li>Plastic bags &amp; containers</li> <li>Coffee cups, lids &amp; sleeves</li> <li>Biodegradable bags</li> <li>All cutlery &amp; plastic chopsticks</li> <li>Diapers</li> </ul>	<p><b>Recyclable Containers</b></p> <ul style="list-style-type: none"> <li>Plastic #1-7</li> <li>Glass bottles &amp; jars</li> <li>Metal cans</li> <li>Coffee cups &amp; lids</li> <li>Recyclable plastic bottles</li> <li>Recyclable cups &amp; cutlery</li> <li>Transparencies</li> <li>Juice boxes</li> <li>Tetrapak containers</li> <li>Milk cartons</li> </ul> <p><b>Keep Out</b></p> <ul style="list-style-type: none"> <li>Plastic bags</li> <li>Styrofoam</li> <li>Dishes, glassware or ceramics</li> <li>Aerosol cans</li> <li>Windows or mirrors</li> <li>Unstamped plastics</li> </ul>	<p><b>Paper</b></p> <ul style="list-style-type: none"> <li>Newspapers &amp; magazines</li> <li>Envelopes</li> <li>Computer paper</li> <li>Cup sleeves</li> <li>Cereal boxes</li> <li>Telephone books</li> <li>Sticky notes</li> </ul> <p><b>Keep Out</b></p> <ul style="list-style-type: none"> <li>Milk cartons</li> <li>Used paper cups &amp; plates</li> <li>Pizza boxes</li> </ul>	<p><b>Garbage</b></p> <ul style="list-style-type: none"> <li>Plastic bags</li> <li>Styrofoam</li> <li>Non-recyclable cutlery</li> <li>Waxed paper</li> </ul>
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Figure 5 – UBC’s Sort it Out waste sorting guide (UBC Sustainability, 2015).

### 1.3.2 Recent waste composition audits

In 2013, a series of waste audits were conducted by TRI Environmental Consulting Inc. to gauge the composition and contamination of post-consumer waste on the main campus. The following tables summarize the composition of contaminants in UBC's waste stream.

**Table 1** – Contamination percentages in waste sorting streams from waste audit in March 2013 at the Wesbrook building. (TRI Environmental Consulting Inc., 2014)

Waste stream	Percentage of contamination by weight	Contaminants
Paper	46%	<ul style="list-style-type: none"> <li>- Recyclable plastic film*</li> <li>- Non-compostable paper cups</li> <li>- Compostable paper cups</li> <li>- Old corrugated cardboard (non-waxed)</li> <li>- Soiled paper*</li> </ul>
Recyclable containers	39%	<ul style="list-style-type: none"> <li>- Food waste with non-compostable packaging*</li> <li>- Compostable food waste*</li> <li>- Non-recyclable plastics</li> <li>- Recyclable plastic films*</li> <li>- Expanded polystyrene</li> <li>- Old corrugated cardboard (non-waxed)</li> <li>- Soiled paper</li> </ul>
Organic waste	21%	<ul style="list-style-type: none"> <li>- Deposit glass beverage containers*</li> <li>- Food waste with non-compostable packaging*</li> <li>- Recyclable plastic films*</li> <li>- Non-compostable paper cups*</li> <li>- Old corrugated cardboard (non-waxed)</li> <li>- Mixed papers</li> </ul>

\* Indicates major contaminant

**Table 2** – Contamination percentages in waste sorting streams from waste audit in November 2013 at outdoor Sort it Out stations. (TRI Environmental Consulting Inc., 2013b)

Waste stream	Percentage of contamination by weight	Contaminants
Paper	67.8%	<ul style="list-style-type: none"> <li>- Paper cups*</li> <li>- Plastic film*</li> <li>- Soiled paper*</li> <li>- Food waste*</li> </ul>
Recyclable containers	49.0%	<ul style="list-style-type: none"> <li>- Soiled paper*</li> <li>- Plastic film*</li> <li>- Food waste*</li> </ul>

\* Indicates major contaminant



**Table 3** – Contamination percentages in the compost streams from waste audit in December 2013 at Totem Residence Dining Hall, Gage Residence, Koerner Library, Caffé Perugia and The Loop Café. (TRI Environmental Consulting Inc., 2013a)

<b>Location</b>	<b>Percentage of contamination by weight</b>	<b>Contaminants</b>
Totem Residence Dining Hall	0.44%	- Non-compostable paper cups and bowls
Gage Residence	38.51%	- Food waste with packaging* - Non-compostable paper cups and bowls - Plastic bags - Metal
Koerner Library	17.23%	- Food waste with packaging* - Non-compostable paper cups and bowls* - Plastic bags - Non-compostable plastics*
Caffé Perugia	52%	- Food waste with packaging - Non-compostable cups and bowls* - Non-waxed cardboard* - Non-compostable cutlery* - Plastic bags - Metal
The Loop Café	2.73%	- Non-compostable paper cups and bowls - Non-compostable cutlery

\* Indicates major contaminant

In March 2014, Common Energy, a student-run organization that aims to incorporate sustainability into all aspects of the UBC community, conducted another waste audit at the Student Union Building (SUB). The SUB was selected most likely due to the high amount of student traffic that moves through it on a daily basis. With guidance from TRI Environmental Consulting, Common Energy sorted through 368.33 kg of waste and determined that 50% of the total waste was sorted correctly. Of the 50% of incorrectly sorted waste, 37% was food scraps, 6% was recyclable containers, 5% was recyclable paper, and 2% was considered garbage (Common Energy UBC, 2014). Common Energy conducted an identical waste audit in March 2015 and sorted through 343.9 kg of waste. Though the total amount of waste sorted was less than 2014, only 39% of the waste was correctly sorted. This lower overall correct sorting rate was attributed to inconsistency in sorting signage due to redesigns made within the year. The items that were commonly sorted incorrectly were: coffee cups, chopsticks, portion-packed sauces, expanded polystyrene, plastic cutlery (with and without a recycling sign), food scraps, soup bowls, sushi containers and soft plastics. Common Energy also suggested avoiding the use of expanded polystyrene containers, unmarked plastic food containers, waxed paper bags and waxed paper cups because they are considered garbage (Common Energy UBC, 2015).

## **2.0 THE RESEARCH PROBLEM STATEMENT**

As Metro Vancouver banned organic waste from all its disposal facilities at the beginning of 2015, public institutions need to implement waste separation protocols that follow the region's new waste policies. Currently within UBC's waste disposal system, there is still significant cross contamination of recycling streams by food service ware – for example, food containers that contain plastic cutlery put into composting bins. The campus has over 40 food services that offer students, staff and visitors a wide spectrum of food options. UBC is looking to improve the source separation of waste, and reduce garbage by only using food service ware that is either recyclable or compostable, and using food service ware that makes waste sorting easier for consumers. For project purposes, food service ware includes paper plates, take-out containers, bowls, hot and cold drink cups, and cutlery provided to customers by food service outlets that typically ends up in the campus waste management system. The hypothesis is that only using recyclable and compostable food service ware will simplify waste sorting at UBC and will decrease the amount of contamination that enters campus composting and recycling streams. Contamination decreases the quality of waste streams and can damage equipment at some composting facilities. In order to make appropriate management changes, the campus needs data on current food service ware needs, recyclable and compostable food service ware product options, as well as how much of the food service ware in UBC's waste system originates from the campus itself.

## **3.0 OBJECTIVES**

The primary research objective was to determine what compostable and recyclable food service ware products UBC should procure to decrease contamination in composting and recycling facilities located within the region. This research was supported by the following secondary objectives:

- Survey food outlets on campus with respect to their food service ware needs and product types currently being used as well as analyze the results.
- Confirm a drafted set of food service ware criteria (Appendix A) with UBC staff.
- Conduct a preliminary assessment of how much of the food service ware in UBC's waste system is from on-campus food outlets vs. off-campus.
- Conduct research on current food service ware products and compare them against the set of criteria developed.
- Develop recommendations and/or guidelines for food service ware selection and procurement based on research.

## **4.0 TECHNOLOGY REVIEW**

### **4.1 Types of food service ware materials and their environmental implications**

#### **4.1.1 Expanded polystyrene**

Restaurants, including QSRs provide a wide range of food service ware composed of various types of materials. Conventional plastic food service ware is derived from non-renewable fossil fuels such as petroleum products. Expanded polystyrene (EPS) is a common conventional plastic that is used to make take-out food containers and cups. It is mass produced inexpensively worldwide and used for its lightweight, stiffness and thermal insulating properties. EPS does not completely degrade into the environment and poses a complex contamination problem for municipalities and waste management. The lightweight material makes it easier to be dislodged from waste bins and transported elsewhere, becoming litter. A report published by the California Integrated Waste Management Board in 2004 states that in 1999, an estimated 300,000 tonnes of polystyrene was landfilled with a total disposal cost of \$30 million. Recycling EPS is technically feasible, however it is not always economically viable due to high costs in hauling and the lack of a market for foam materials. Recycling food service ware made from polystyrene is also difficult because of contamination from food (Nguyen, 2012).

EPS persists in the environment posing threats to marine life and occupational safety. Pieces of polystyrene often resemble food to many marine species and once ingested, can cause reduced appetite, reduced nutrient adsorption, and starvation. The synthetic chemical styrene used in the production of polystyrene can cause significant hazards to human health. Although polystyrene can be degraded, it releases dangerous products like styrene, benzene, toluene and acrolein. Exposure to styrene and its products usually occurs in occupational settings. It can be absorbed through inhalation and skin contact causing harm to the central nervous system. Symptoms include headaches, fatigue, dizziness, drowsiness, light-headedness, confusion, malaise, difficulty concentrating, balance disturbances and the feeling of intoxication. Workers who are chronically exposed to styrene are at increased risk of developing depression, kidney dysfunction and cancer. The International Agency for Research on Cancer classifies styrene as a potential human carcinogen (Nguyen, 2012). Polystyrene packaging can also leach molecules of styrene into food. In 2011, the United States federal government added polystyrene to its list of chemicals that are reasonably anticipated to cause cancer (Responsible Purchasing Network, 2012).

#### **4.1.2 Bio-based plastic polymers**

Other plastics are composed of bio-based polymers, which are generated from natural materials, and may not be as persistent in the environment. These natural materials are starches from corn, potato, tapioca, rice and wheat; oils from palm seed, linseed, soybeans; and fermentation products like polylactic acid (PLA), polyhydroxyalkanoate (PHA), and polyhydroxybutyrate (PHB).

Bio-based and compostable food service ware fall into four main categories:

- Cutlery (knives, forks, spoons, and “sporks)
- Food service ware (plates, bowls, cups, etc.)
- Take-out containers (boxes, clamshells, and other types of containers with lids)
- Other items (straws, food service gloves, bags, etc.)

(Responsible Purchasing Network, 2012)

Biodegradability is defined as a process where all material fragments are consumed by microorganisms as food and energy sources. Biodegradable polymers do not have any remaining residuals or by-products after complete degradation. Some additives can be added to petroleum-based polymers causing them to behave similarly to biodegradable plastics by fragmenting in soil. Starches and degradable additives do not make these polymers biodegradable since microorganisms in the soil solely consume the starch portion of the plastic. The remaining plastic fragments in the soil may take many decades to fully disappear and can cause considerable environmental harm to animals upon ingestion (California State University, 2007).

Biodegradability also indicates that degradation will occur in a reasonable time frame. A practical time span for a material to be considered biodegradable is one growing season or 180 days. The speed of biodegradation can be controlled with the number and type of microbes, the humidity, and temperature (California State University, 2007; Nguyen, 2012). As traditional petroleum-based plastics can degrade completely in about 100 years, they are not considered biodegradable. The American Society for Testing and Material (ASTM) considers a degradable plastic as a material, which is degraded completely from the action of naturally occurring microorganisms such as bacteria, fungi, and algae. True biodegradable plastics should behave exactly the same as other organic materials in the soil like sticks and leaves (California State University, 2007).

Compostable plastics are a subset of biodegradable plastics and have a more rigorous definition. The term compostable indicates that the plastics will not only completely degrade, but will also be consumed in 180 days or less under proper composting conditions. The ASTM requires that compostable plastics degrade by biological processes yielding carbon dioxide, water, inorganic compounds and biomass within the appropriate timeframe without leaving behind any distinguishable traces or toxic residues (California State University, 2007).

Tree fibres and other types of vegetation can also be used to produce compostable paper products like plates, cutlery and cups. Bagasse, which is extracted from sugarcane, has been used to make compostable food service ware. It is suitable for hot and cold food, and is heat resistant up to 104°C. Paper and paperboard made from either virgin or recycled tree fibres and coated with PLA are also compostable options (Nguyen, 2012).

### 4.1.3 Life Cycle Assessments

In addition to how materials degrade after disposal, it is also important to consider a material's overall environmental impact as it is produced and used. Life Cycle Assessments (LCA) examine the environmental impacts of every stage of a product's lifetime from "cradle to grave". In 2013, Wachter et al. conducted a LCA analysis of dining ware at the Alfred Packer Grill, University of Colorado at Boulder. The assessment included compostable items such as PLA salad bowls and forks as well as paper soup cups and sugarcane clamshells. They also examined several types of durable ware including melamine plates, ceramic plates, and plastic soup and salad bowls. An exchangeable polypropylene clamshell take out container was also included in the analysis. Environmental impact was determined using the GaBi Educational software and data sourced from several databases. Impacts were quantified under the following parameters: Global Warming Potential, Eutrophication Potential and Acidification Potential. Wachter et al. determined that PLA products from the company Eco Products have a larger overall impact than any other material used in its product line including paper soup cups and bagasse clamshells. When the exchangeable polypropylene clamshells were compared to the PLA food service ware, the emissions associated with the PLA were significantly lower. The largest contributor to the environmental impact of the PLA containers in global warming, acidification and eutrophication potentials was the electricity used during the manufacturing process in Asia (Wachter et al., 2013).

When compostable dishware was compared to reusable dishware for a single use, it was found that the compostable dishware had the smaller carbon footprint and water quality impact. As the number of uses increases, the environmental impact of some compostable products surpasses the impact of reusable dishware. The cost and environmental impact of reusable food service ware decreases with the number of times it is used. Therefore, any use beyond the break-even point is more environmentally favourable and cost-efficient. Wachter et al. recommend shifting to reusable food service ware from compostable food ware to save money. They also suggest finding domestically produced take-out containers that are more durable to increase reusability and decrease environmental impacts. Compostable items are the most ideal take-out option for customers because their life cycle impacts are lower on a one-time use basis (Wachter et al., 2013). Generally, bio-based and compostable food service ware is expected to be more expensive than conventional items that are made with petroleum products. However, these additional costs may be offset by avoided waste disposal costs as composting services often cost less than landfill disposal (Responsible Purchasing Network, 2012; California State University, 2007; Health Care Without Harm, 2010).

## 4.2 Food service ware criteria and best practices

To simplify the selection process of food service ware, the organization Health Care Without Harm has created an Environmentally Preferable Purchasing Hierarchy. Health Care Without Harm is an international coalition whose members and contributors include hospitals, health care systems, medical professionals, community groups, health-affected constituencies, labour unions, and environmental health organizations (Health Care Without Harm, 2015). The organization's Environmentally Preferable Purchasing Hierarchy is based on the environmental performance of the products across their life cycle and is summarized in Table 4.

**Table 4** – Health Care Without Harm's Environmentally Preferable Purchasing Hierarchy (Health Care Without Harm, 2010)

<b>Most Preferred</b>	Reusable food service ware
<b>More Preferred</b>	Biobased products – Meet Beyond Baseline Sustainability Criteria
<b>Preferred</b>	Biobased products – Meet Baseline Sustainability Criteria
<b>Less Preferred</b>	Biobased products – Do not meet Baseline Sustainability Criteria
<b>Least Preferred</b>	Fossil fuel-based disposable products

The hierarchy corresponds to two sets of criteria that can be used to evaluate prospective biobased products: the Baseline Sustainability Criteria and the Beyond Baseline Sustainability Criteria. These sets of criteria evaluate what materials and additives are put into the food service ware products, whether they are certified by an acceptable certification organization, and whether genetically engineered or modified feedstocks have been used to generate the products (Health Care Without Harm, 2010). Both sets of criteria are included in the Appendices section (Appendix B and C) and explain the rationale behind their components.

The Sustainable Biomaterials Collaborative (SBC) also provides a set of goals and steps to best practices for the following stages of a bioplastics life cycle: Feedstock Production and Transportation, Processing and Manufacturing, Product Distribution and Use, and End of Product Life. Although they are intended for the procurement of biobased plastics, they can be applied to all food service ware materials. The first goal in Product Distribution and Use is to reduce the quantity of disposables and to efficiently use reusable ware whenever possible. Next, the SBC suggests avoiding unhealthy exposures from products during use and after use. The SBC also emphasizes that public awareness of products and their materials as well as creating opportunities for sustainability education are important in reducing the usage of conventional fossil-fuel based products. Selecting products from local manufacturers and suppliers will also decrease the carbon emissions associated with distribution (Sustainable Biomaterials Collaborative, 2009).

The overall goal of compostable and biobased products is to ensure that the loop is closed and the materials are cycled back at the end of the product's life to be reutilized. The most preferred post-consumer options are closed loop recycling and composting to generate a safe soil amendment product. In some cases, recycling biobased plastics in a closed loop primary recycling system can represent higher value end use than composting as more of

the energy and resources embodied in the product are reclaimed. The SBC suggests selecting products that will safely and rapidly degrade in local composters. It refers to ASTM's D6400-04 Standard Specification for Compostable Plastics as an important certification to seek out (Sustainable Biomaterials Collaborative, 2009). The ASTM D6400 standard certifies compostable plastics and ensures that they will degrade in municipal and industrial aerobic composting facilities over a 180-day time period. The standard evaluates whether bioplastics and products made from bioplastics degrade at a rate comparable to known compostable materials and ensure biodegradation of these products will not contaminate the compost site nor decrease the quality of the finished compost (California State University, 2007).

### **4.3 Important considerations for sustainable food service ware contracts**

To ensure that the needs of customers, food service locations and municipal processing facilities are met, there are two main questions that need to be answered:

- A. What types of compostables and recyclables do contract users need?
- B. What types of compostables and recyclables are likely to be accepted in composting facilities located within the Metro Vancouver region?

To answer question A, the types of food service ware that are purchased and used the most need to be determined. It would be useful to consult contract usage reports and records to gain knowledge of the highest number of units purchased and where most of the funds are being spent. The goal is to establish which types of items are the most important to contract users. It is also important to consider whether contract users have specific design and performance requirements as well as whether customers have additional preferences. Design requirements may include the size or shape of the food service ware as well as temperature tolerance and weight capacity. Anticipating the way food service ware users will dispose their waste is also key. Generally, minimizing the amount of sorting at waste bins is recommended. Sorting recyclables from compostables will require extensive labelling and signage. Providing 100% compostable bins will increase efficiency in high traffic locations because less time will be spent sorting. Identifying opportunities for confusion and contamination, and preparing corresponding solutions will help ease the transition into a new food service ware contract (Responsible Purchasing Network, 2012).

In some municipalities, composting facilities may only accept paper and wood-based products, some may only accept commercially certified products, and others may prefer to test the compostability of products in their facilities before they are accepted. Therefore, question B is equally as crucial as question A. Products that damage composting equipment or eventually reach the landfill defeat the purpose of selecting compostable food service ware. It will be important to determine what standards of compostability the composting facilities in the Metro Vancouver region require. It is useful to create a guide of products that are already approved by local composters.

If composting facilities need to test the products, the following details will need to be established:

- Clarify how the test will be done and how long the testing period will be
- Learn how many samples the composting facilities will need
- Understand how compostability and acceptability will be determined

As products are deemed acceptable or not acceptable to local composting facilities, keep a record of which ones to exclude from the contract's purchasing list. Creating a "red" list including all products with poor environmental performance and impact, that are associated with health risks, and are not compatible with local composting facilities will help explain to contract users why certain products are no longer purchasable (Responsible Purchasing Network, 2012).

## **5.0 METHODOLOGY**

### **5.1 ISO 14001: 2015**

ISO 14001 is a set of criteria published by the International Organization for Standardization (ISO) that outlines requirements for environmental management systems. The standard guides organizations to continually improve their environmental performance through more efficient use of resources and reduction of waste. The framework enables organizations to achieve accountability with stakeholders and exceed their expectations of environmental integrity. The most recent revision to the standard in 2015 urges organizations to prioritize environmental management in their strategic plans as well as develop more involvement and commitment from leadership. There is a greater emphasis on the need for life-cycle thinking to ensure consideration of environmental impact from development to end-of-life (International Organization for Standardization, 2015). ISO 14001:2015 includes seven main themes: Context of the Organization, Leadership, Planning, Support, Operation, Performance Evaluation and Improvement (Bureau Veritas, 2015).

Understanding an organization and its context involves determining the needs of stakeholders. While UBC's waste reduction context has been outlined in sections 1.1 to 1.3, food service ware needs across campus may not be completely understood to date and the current project will aid in providing this information. Once stakeholder needs are considered, adjustments to improve environmental performance can be implemented more smoothly. The other six themes of ISO 14001:2015 will be applied to the Recommendations section (section 8.0) of this project report.



## 5.2 Establishing the project's scope

This project used Metro Vancouver's Food-Soiled Paper Task Group's work (2014) and ISO 14001:2015 as models in ensuring that all food service vendors on UBC campus were represented and their food service ware needs were considered. Project work was carried out in consultation with representatives from UBC Sustainability, which maintains close working relationships with the majority of the food vendors on the main campus.

UBC has a wide array of food services on campus that are managed through different authorities. The majority of the cafés and bistros throughout the main campus are operated by UBC Food Services, an extension of Student Housing and Hospitality Services (SHHS). UBC Food Services also manages two residence dining rooms, five food trucks, concessions at sports arenas, and a catering service through Wescadia (UBC Food Services, 2016). The food outlets in the Old Student Union Building and the Nest are operated by the Alma Mater Society (AMS), which is committed to improving the educational, social and personal lives of students at UBC (UBC AMS, 2016). The campus also leases out commercial space to franchises and chains such as Starbucks, Subway, Tim Horton's, White Spot Triple O's, Bento Sushi, QOOLA Frozen Yogurt Bar and LIQUID Nutrition. In addition, there are numerous independently owned and operated food services throughout the campus. These locations source their own food service ware.

In order to set the scope of investigation, a list of all the university's food service locations was compiled and the following aspects were considered: which management group operates them, whether UBC collects their waste, whether their waste enters UBC's waste system, and whether UBC has control or leverage over their purchasing. The inclusion of an outlet in this project depended on two major criteria: How much they contribute to UBC's waste system and how much influence UBC Sustainability, UBC Food Services and the AMS have over their purchasing choices. Generally, QSRs were prioritized over "dine-in" restaurants, as the fast food outlets were expected to generate the most waste on a consistent basis. Therefore, this project excluded all "dine-in" restaurants without a QSR option, sports arena concession stands, catering services and convenience stores with the exception of the newly opened Corner Store at the UBC Bookstore.

### 5.2.1 Food outlets and trucks operated by UBC Food Services

Eleven cafés or bistros were selected to represent UBC Food Services based on geography as well as menu composition. UBC Food Services operates many food outlets on the main campus, therefore it was important to survey locations that were distributed throughout the area and that encompassed all menu items supplied through the service. The food outlets included in Table 5 were surveyed.

**Table 5** – Surveyed food outlets operated by UBC Food Services. The information on type of cuisine is from the UBC Food Services website (2016). Please refer to Appendix D for a map of these cafés and bistros.

Location	Type of Cuisine	Activity Level
Caffé Perugia	Roast chicken/sundried tomato salmon with salad and pasta, classic baked and tossed pastas, flatbreads, soups, salads and Italian-style wraps and sandwiches, pastries, and breakfast sandwiches.	High
Ike's Café	Coffee, pastries, sandwiches, wraps, salads, samosas, pasta, soup, snack items	High
Law Café	Sandwiches, soups, snacks, beverages	Low
The Loop Café	Burritos and curry dishes, fresh salad bar, pastries, natural iced teas and lemonades, coffee/tea	High
Mercante	Traditional Italian pizzas cooked in a fiery-hot stone hearth oven. Pastas, salads, desserts and specialty coffees.	High
Niche Café	House-made soups, sandwiches, coffee/tea and snacks	High
Reboot	Breakfast pastries, coffee/tea, soup, salad, samosas, sandwiches	Moderate
Sauder Exchange Café	Breakfast pastries, coffee/tea, soup, salad, samosas, sandwiches	High
Stir it Up	Soup, sandwiches, paninis, baked goods and snacks	Moderate
Totem Residence Dining Hall	Asian cuisine, daily pasta, pizza, burgers, made-to-order sandwiches and sweet desserts	High
Vanier Residence Dining Hall	Pasta, fresh deli sandwiches, made-to-order omelettes, pizza, Asian cuisine, salad bar, healthy smoothies and snacks	High

Activity level scale (customers/week): Low – 0-200, Moderate – 200-500, High – >500

\*This scale is based off of estimates

In addition, UBC Food Services operates five food trucks that are distributed on a rotational basis along the campus's busy corridors. These food trucks were also surveyed and are listed in Table 6.

**Table 6** – Surveyed food trucks operated by UBC Food Services. The information on type of cuisine is from the UBC Food Services website (2016).

<b>Food Truck</b>	<b>Type of Cuisine</b>	<b>Activity Level</b>
It's About Thai	Pad Thai, cashew salad, curries	Low
Roaming Bowl	Asian-inspired chicken, beef and vegetarian noodle and rice bowls	Low
School of Fish	Fish tacos, fish and chips, grilled Sockeye salmon, pasta salad	Low
The Dog House	Hot dogs with specialty toppings	Low
The Hungry Nomad	Grill cheese sandwiches, Montreal poutine, parmesan fries, chicken tacos, pulled pork sandwiches, soup	High

Activity level scale (customers/week): Low – 0-200, Moderate – 200-500, High – >500

\*This scale is based off of estimates

## 5.2.2 The AMS Nest

As the newly built AMS Nest is a site that is frequently visited by many students, staff and visitors on daily basis, it was crucial to thoroughly cover all food service ware distributed in the building. All eleven of the food services located in the Nest were surveyed because their menus heavily differ from one another. These outlets are listed below in Table 7 and include both locations that are operated by the AMS as well as commercial spaces that are leased out through the AMS in the Nest. These outlets are identified as lessees in the table.

**Table 7** – Surveyed food outlets in the AMS Nest. The information on type of cuisine is from the UBC Food Services website (2016).

Location	Type of Cuisine	Activity Level
The Delly (Lessee)	Indian, Pakistani, sandwiches, salads	High
Flip Side	Burger and fries joint: Hand-made burgers with freshly baked potato buns.	Moderate
Granville Island Soup Market (Lessee)	Salads, soups and bread	Moderate
The Grand Noodle Emporium	Classic Chinese take-out, Noodle bowls, Hunan Pork, Pad Thai	Moderate
LIQUID Nutrition (Lessee)	Smoothie and juice bar	Low
PALATE	Vegan/Vegetarian food: salads, gluten-free sweet and savoury treats, paninis, sandwiches, wraps, soups	Low
Peko Peko	Sushi, Don buri bowls and bento boxes	Low
PieR^2	Pizza with specialty toppings	Moderate
QOOLA (Lessee)	Frozen yogurt, savoury waffles, salads, sandwiches	Moderate
Uppercase	Cookies, baked goods, sandwiches, bagels, coffee, tea	Moderate
Lowercase	Cookies, baked goods, sandwiches, bagels, coffee, tea	Moderate

Activity level scale (customers/week): Low – 0-200, Moderate – 200-500, High – >500

\*This scale is based off of estimates

### 5.2.3 Independently-run and chain outlets

In addition to UBC Food Services and the AMS, twelve locations run by chains or independent groups were surveyed because they are situated on the main campus and also contribute to UBC’s waste system. These food outlets are listed below in Table 8 and a map is available in Appendix E. Bento Sushi, Subway, Tim Horton’s and Triple O’s are operated through UBC Food Services. This means that UBC Food Services manages the staff that works at these franchises and is able to manage menu items, food service ware and waste bins to an extent to align with UBC’s sustainability strategies.

**Table 8** – Surveyed food outlets that are independently run or operated by chains. The information on type of cuisine is from the UBC Food Services website (2016).

Location	Type of Cuisine	Activity Level
Bean Around the World	Specialty coffee, pastries, sandwiches, wraps, salads	High
Bento Sushi	Sushi, rice bowls, noodle bowls, salmon and chicken dishes	Low
Boulevard	Specialty coffee, pastries, sandwiches, wraps, salads	High
Café Ami	Coffee, pastries, sandwiches, wraps, salads, soup	Moderate
Café MOA (Museum of Anthropology)	Coffee, pastries, sandwiches, wraps, salads, soup	Moderate
Cornerstore/Peqish	Coffee, pastries, sandwiches, wraps, salads, sushi	High
Great Dane	Specialty coffee, pastries, sandwiches, wraps, salads, soup	High
Loafe Café	Specialty coffee, pastries, sandwiches, wraps, salads, soup	High
Starbucks	Handcrafted beverages including fresh-brewed coffee, hot and iced espresso beverages, Frappuccino® coffee and non-coffee blended beverages, smoothies and teas. Baked pastries, sandwiches, salads, oatmeal, yogurt parfaits and fruit cups.	High
Subway	Sandwiches, soups, salads	High
Tim Horton’s	Coffee, tea, muffins, donuts, sandwiches and soups	High
Triple O’s	Burgers, fries, salads, soups	High

Activity level scale (customers/week): Low – 0-200, Moderate – 200-500, High – >500

\*This scale is based off of estimates

### **5.3 Assessing the needs of food vendors**

As discussed in the technology review, before making changes to food service ware purchases, it is important to establish what food service ware items vendors will need. This information was collected through a food service ware survey and in consultation with campus food outlet menus. The author conducted food service ware surveys as well as analyzed the respective data and results. Each of the food outlets was visited between November 2015 and February 2016 during the fall and winter terms when the food outlets were operating at maximum capacity. After examining the food service ware used at a particular location, the survey was filled out. Whenever possible, product brands were also noted down.

The survey covered 14 food service ware categories with the possibility of three additional items if they were found during a visit to a food outlet. The full survey is included in Appendix F.

These categories are listed below:

- |                                     |   |
|-------------------------------------|---|
| A. Hot drink cups                   | J. Utensils (forks, knives, spoons)                   |
| B. Hot drink lids                   | K. Chopsticks   |
| C. Cold drink cups                  | L. Straws   |
| D. Cold drink lids                  | M. Paper wrappers/sleeves (e.g. sandwiches, burritos) |
| E. Bowls (e.g. soup, rice, noodles) | N. Napkins  |
| F. Bowl lids                        | O. Other item   |
| G. Food take-out containers         | P. Other item   |
| H. Plates                           | Q. Other item   |
| I. Boxes and trays                  |   |

### **5.4 Conducting targeted spot audits at Sort it Out stations**

In addition to filling out food service ware surveys for outlets throughout the campus, targeted spot audits were conducted at Sort it Out stations to identify the likely source of food service ware and whether they originated from campus or from locations off-campus. This also offered confirmation of what products are actually in use at the food outlets.

The author conducted a total of 14 audits at Sort it Out stations as well as analyzed the respective data and results. Spot audits at Sort it Out stations occurred either during the fall term in November 2015 or the winter term in January 2016 when food outlets were operating at maximum capacity. The audits included all four bins at Sort it Out stations since food service ware could have ended up in any of them. Audits were conducted in locations distributed throughout the campus and occurred either inside campus food outlets or in close proximity to them depending on where the Sort it Out stations were situated (Appendix G portrays these locations). Generally, locations that were busier were audited more than once at different sorting stations. The audits were carried out between 11:00am and 2:30pm on weekdays to ensure peak lunch hours were appropriately represented. They were completed by taking pictures of bin contents or through

observation of waste sorting that occurred at the sorting stations. The pictures of bin contents allowed easy in-depth analysis after the data was collected. Waste sorting at the Sort it Out stations was also observed to offer insight into the sorting behaviours that occur as people sort their waste.

## **5.5 Data analysis**

Once the surveys were filled out for all of the food outlets listed in section 5.2, the data was inputted into Excel tables which indicated what material the food service ware items were made of and which sorting stream they ought to be sorted into. This was done in consultation with the campus Sort It Out guide (Figure 5), City of Vancouver's Waste Wizard and Bud Fraser, UBC's Waste Engineer at Campus and Community Planning. The City of Vancouver's Waste Wizard allows a user to search for a type of item and provides instructions on which sorting stream the item ought to be placed into. The number of item types were graphed for each food service location using stacked bar graphs to show how many types of items were expected to be sorted through the organics/compost, recycled containers, recyclable paper and garbage streams.

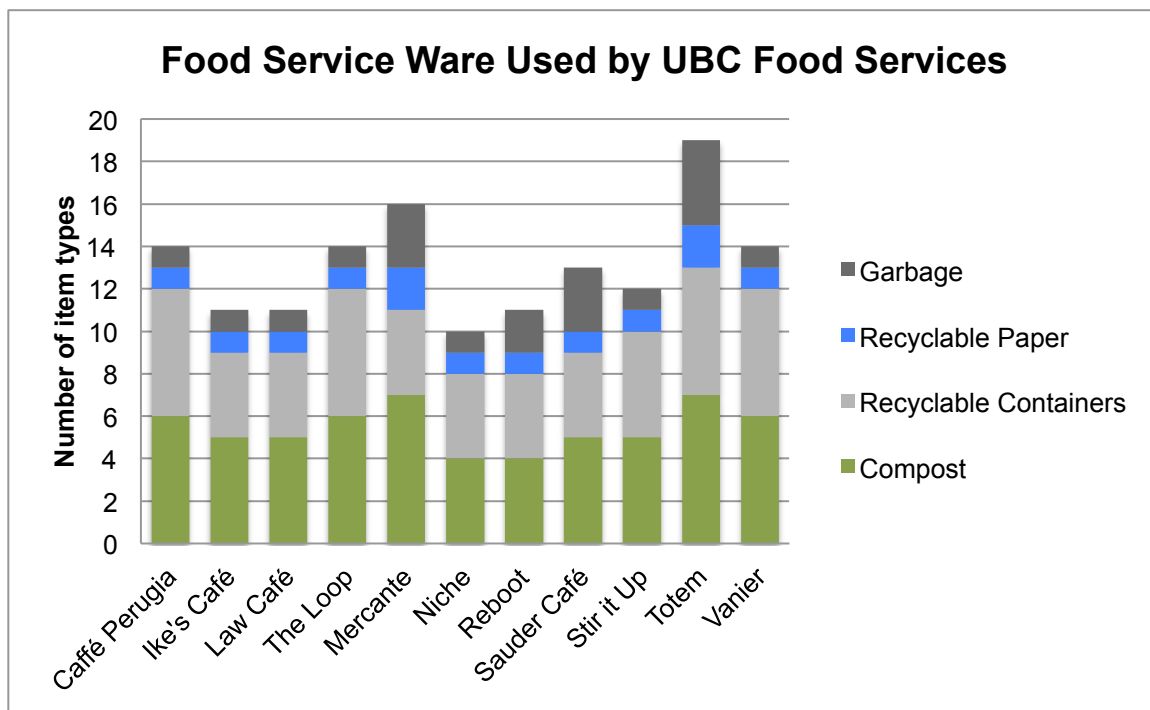
Pictures and notes from the spot audits were used to create lists of item types in each of the sorting bins. It was also noted whether each of the item types was sorted correctly. The numbers of item types that were sorted correctly at each sorting station were graphed as percentages for easy comparison. Though they were not full waste composition audits, the spot checks offered valuable insight into which items were commonly being sorted incorrectly and where poorer sorting practices were occurring.

## 6.0 RESULTS

### 6.1 Food service ware inventories at food outlets

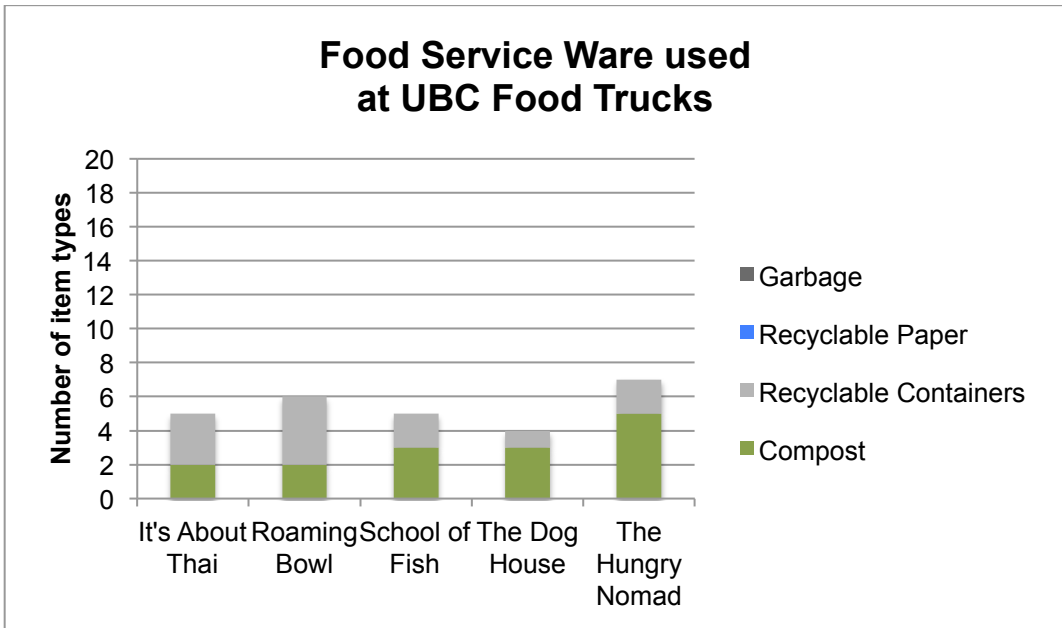
#### 6.1.1 Food outlets and trucks operated by UBC Food Services

The following two figures (Figure 6 and Figure 7) portray the number of food service ware types that each of the surveyed UBC Food Services outlets and food trucks uses. Based on the UBC sorting guide, the graph colours indicate how many types of items would be thrown into the compost, recyclable containers, recyclable paper and garbage streams at a particular outlet. Across the campus, the majority of food service ware types are either compostable or recyclable. Straws would always be thrown into the garbage because they are made of unmarked plastic. The Totem Residence Dining Hall uses the most types of food service ware and it is worthy to note that the food trucks use significantly less types of food service ware. Mercante, Sauder Exchange Café and the Totem Residence Dining use more types of food service ware that would be thrown into the garbage stream. These items include unmarked plastic cutlery, composite paper and plastic sleeves from Eco Craft, aluminum-lined sleeves and sandwich toothpicks lined with cellophane.



**Figure 6** – The number of food service ware types used by selected cafés and bistros operated by UBC Food Services. This data was collected in November 2015.

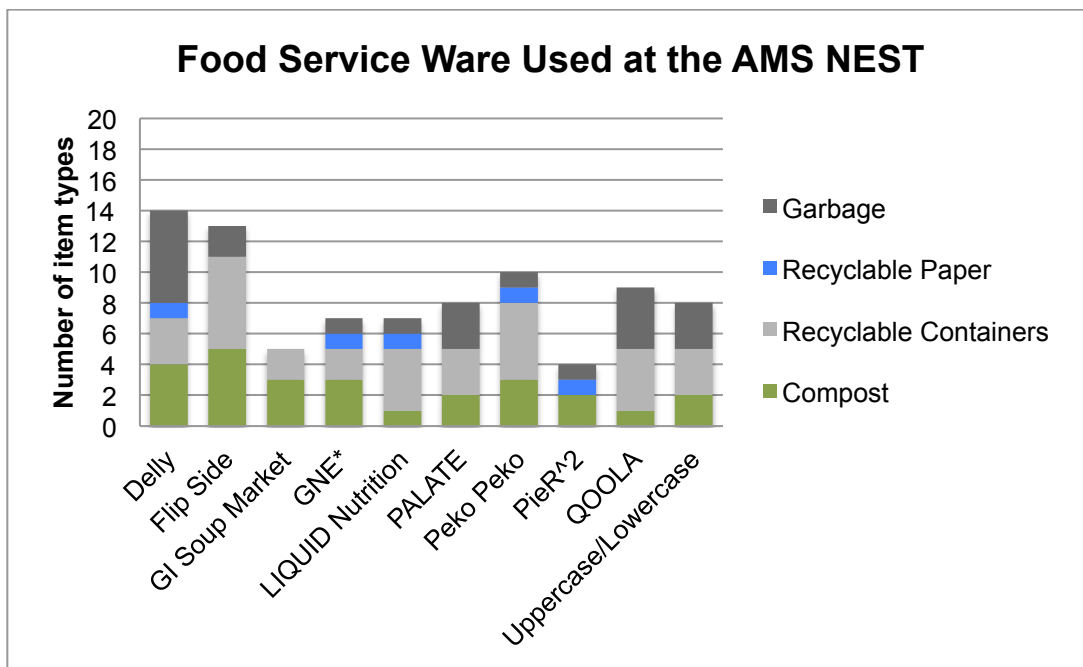




**Figure 7** – The number of food service ware types used by food trucks operated by UBC Food Services. This data was collected in February 2016.

### 6.1.2 The AMS Nest

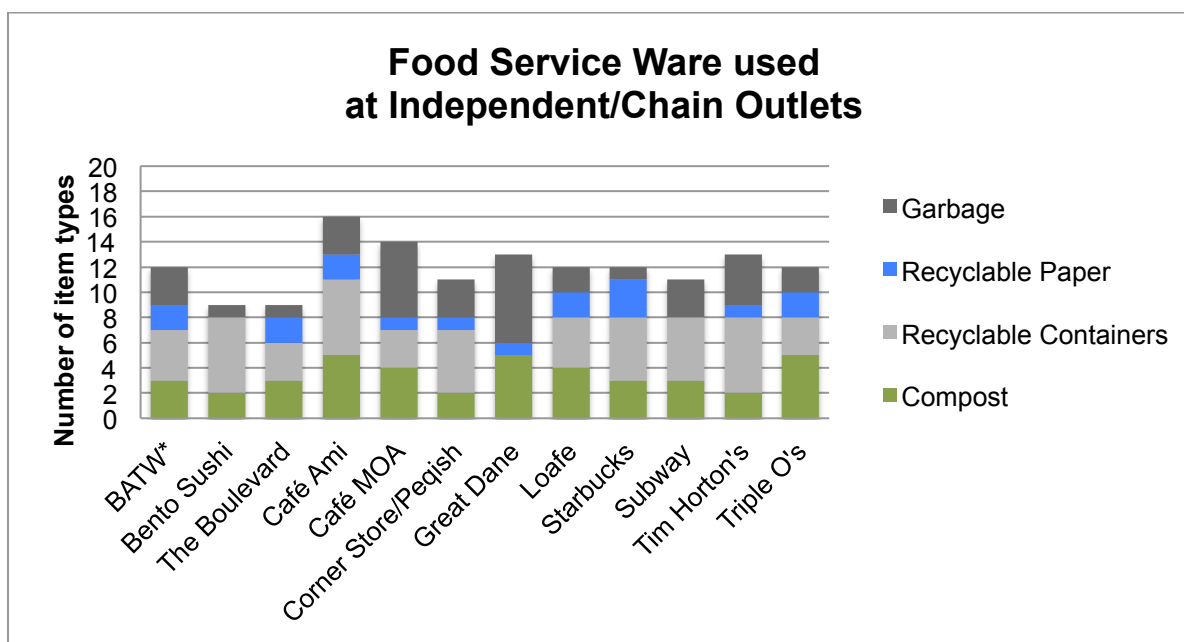
Figure 8 shows the number of food service ware types that each of the outlets in the AMS Nest uses. While these food services use fewer types of food ware items than the ones operated by UBC Food Services, there is a greater diversity between locations because their menus are so different. The Delly, PALATE, QOOLA, Uppercase and Lowercase use more types of food service ware that would be thrown into the garbage stream. The Delly has a higher amount of items destined for the landfill because a large fraction of them are compostable or biodegradable plastics from the company Eco Products. These plastics are made from biopolymers that are designed to readily break down but are considered as contaminants in both the compost and recyclable containers streams. QOOLA is also using compostable plastic cups and biodegradable spoons. PALATE, Uppercase and Lowercase are using unmarked plastic spoons as well as composite paper and plastic sleeves from Eco Craft, which would be sorted into the garbage. Unmarked or biodegradable straws are also used at all the outlets in the Nest.



**Figure 8** – The number of food service ware types used by food outlets in the AMS Nest.  
 \*Grand Noodle Emporium. This data was collected in January 2016.

### 6.1.3 Independently-run and chain outlets

Figure 9 represents the number of food service ware types used at the independently-run and chain food services on campus. For most of these outlets, the results are similar to the results from locations operated by UBC Food Services and in the AMS Nest. Café MOA, Great Dane and Tim Horton's use more types of food service ware that would be thrown into the garbage stream. Café MOA and Great Dane are using biodegradable and compostable plastics, which are not compatible with UBC's compost system. Other items that would be landfilled from Tim Horton's and other outlets in this category include: unmarked plastic cutlery, unmarked plastic soup bowl lids, unmarked plastic sleeves, plastic bags and unmarked plastic stir sticks. Unmarked or biodegradable straws are also used at these food services.



**Figure 9** – The number of food service ware types used by independently-run and chain food outlets. \*Bean Around the World. This data was collected in February 2016.

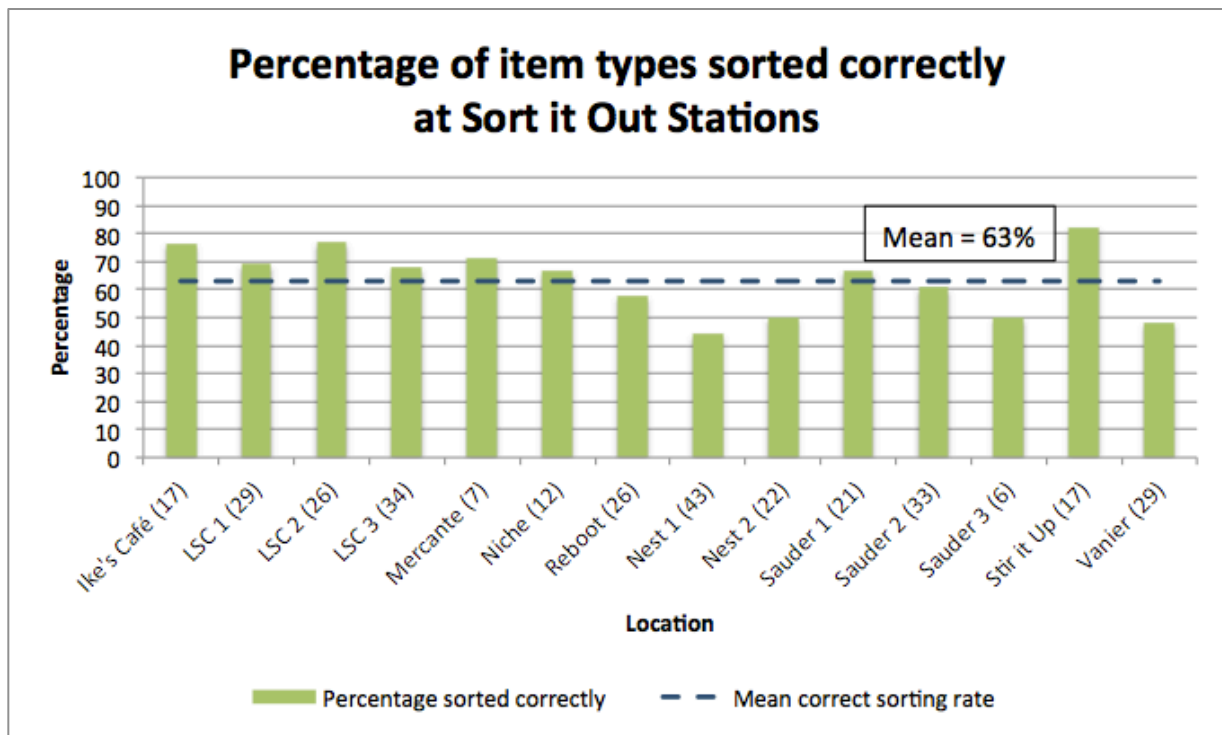
#### **Key observations during food service ware surveys**

While completing the food service ware surveys, a couple key observations were noted. Although some food outlets do not use cold drink cups and lids, all locations offer drinks in recyclable bottles and cans. In addition, out of the 39 surveyed food outlets, 10 offer reusable bowls, plates, cups and metal cutlery options if the food is going to be eaten in-house. These food services are listed below:

- Caffé Perugia
- Totem Residence Dining Hall
- Vanier Residence Dining Hall
- The Grand Noodle Emporium
- Bean Around the World
- The Boulevard
- Café Ami
- Café MOA
- Great Dane
- Loafe Café

## 6.2 Targeted spot audits at Sort it Out stations

Figure 10 shows the percentages of item types correctly sorted at audited Sort it Out stations. In total, the spot audits included 322 sorting events. A sorting event is defined as the opportunity to place an item in a given bin at a given sorting station. If the item, bin, or sorting station changed, it was considered a different sorting event. The mean percentage of item types sorted correctly across the campus was 63%. The AMS Nest, Sauder Exchange Café and Vanier Residence Dining Hall had correct sorting rates of 50% or lower. The items that were most commonly sorted incorrectly were: coffee cups, coffee cup lids, coffee cup sleeves, paper sleeves, compostable take-out containers, chequered food wrapping paper, compostable Nature bowls, recyclable Nature bowl lids and soiled napkins. Out of the 322 sorting events, seven (2%) involved items that evidently came from off-campus, meaning that up to 98% of the items analyzed during the spot audits was from the main campus. The exact percentage of items from on campus cannot be determined as the origin of food scrap items could have been from off-campus as well. Items from off-campus included: pizza boxes from San Remo and Pizza Hut, miscellaneous cardboard packaging, an expanded polystyrene takeout container, a ZARA bag, a Little Burgundy bag and another miscellaneous plastic retail bag.



**Figure 10** – Percentage of items sorted correctly at audited Sort it Out stations throughout UBC's main campus. The bracketed numbers indicate how many types of items were sorted at each sorting station. Audits were conducted in November 2015 and January 2016.

## ***Key observations during spot audits at Sort it Out stations***

While conducting the spot audits, several observations were noted about the sorting behaviours that occurred as people sorted their waste. On two separate occasions, individuals were seen placing all their food service ware including compostable items and recyclable items into paper bags or plastic bags, and disposing the bags as a whole item into one of the bins. When this occurred, the items were considered not sorted properly. Some people who sorted incorrectly also appeared in a hurry or distracted while looking at their phones. On other occasions, people appeared confused about which bin to place their items into and they started looking into the bins for guidance. Incorrect sorting was also triggered when the bins at sorting stations were full, usually at locations that were very busy during peak lunch hours. In these cases, people left their items on top of the correct bin or put their items into another bin at the station that still had room. In addition, although the Sort it Out stations are widely distributed throughout the campus, in-house disposal stations in some of the independently-run and chain outlets are still solely garbage bins or don't align with the Sort it Out system. A full list of these locations is included in the Recommendations section (section 8.3.2).

## **7.0 DISCUSSION**

### **7.1 Food service ware to replace**

As the project survey results show that the majority of the food service ware used at UBC is either compostable or recyclable, the campus's effort to minimize its waste through the garbage stream is very apparent. Following their waste audit in March 2014, Common Energy recommended that the AMS stop using expanded polystyrene and waxed paper bags. These changes have successfully been implemented as the AMS Nest opened in June 2015. Expanded polystyrene and waxed papers are also not being used anywhere else on the main campus.

Currently, the items that would be thrown into the garbage and landfilled are: unmarked plastic cutlery, composite paper and plastic sleeves, aluminum-lined sleeves, toothpicks lined with cellophane, compostable or biodegradable plastics, unmarked plastic soup bowl lids, unmarked plastic sleeves, plastic bags and unmarked plastic stir sticks. There are compostable or recyclable alternatives that could easily replace these items without compromising function. Plastic products ought to be marked with a recycling sign and number, and should not be compostable or biodegradable. This would minimize confusion and communicate to users that these items should to be thrown into the recyclable containers bin. While biodegradable and compostable plastics are reasonable solutions in other cities, they currently do not break down in UBC's in-vessel composter and would not be compatible at composting facilities in the Metro Vancouver region. Unmarked plastic sleeves, aluminum-lined sleeves and composite sleeves could be replaced with compostable plain paper sleeves. Composite items that are made from multiple types of materials are not ideal because they cause confusion about how they ought to be sorted. In most cases, people will not take the time to dissect these items and they will end up

contaminating the composting stream or one of the recycling streams. In the case of the paper and plastic sleeves, the March 2013 waste audit at Wesbrook Building identified plastic films as major contaminants indicating that they do not currently belong in any of UBC's sorting streams aside from the garbage. In addition, plastic stir sticks could be replaced with plain wooden stir sticks or the raw fettuccini noodles used within UBC Food Services.

## **7.2 Other factors that affect waste sorting practices on campus**

The survey results also show that some food outlets are using more types of food service ware than others and it was noted that the diversity of items within the AMS Nest is greater than diversity at cafés and bistros operated by UBC Food Services. In 2014, Menzer et al. conducted a study at the University of California at Santa Barbara to identify factors that influence personal waste sorting practices. They found that though signage played a part in helping people sort, other components affected sorting behaviours as well. The more diverse a food service ware supply is, the more confusing and complex it is for individuals to sort and dispose of their items correctly. A higher diversity of food service ware items also makes it difficult to design signage that incorporates enough variety of materials to be effective. As discussed in section 6.2, the items most commonly sorted incorrectly are disposable coffee cups, coffee cup lids and coffee cup sleeves. This is likely caused by the necessity to separate the coffee cup sleeve from the coffee cup and throw them in two separate bins. Eliminating the coffee cup sleeve would solve this issue. In the Nest, Uppercase and Lowercase use sleeveless coffee mugs and as a result, coffee cup sleeves were not among the contaminants seen during spot audits at the Sort it Out stations in the Nest. In addition, the larger and more variable a customer base is, the more difficult it is to establish familiarity with products. Familiarity with products is an important component in consistently sorting items correctly (Menzer et al., 2014).

These factors would help explain why correct sorting rates were poorer at the AMS Nest and the Vanier Residence Dining Hall. Since the Nest and its food services recently opened in 2015, the students, staff and visitors most likely have not become familiar with the food service ware types that are available there. Although the Nest is a building that is frequently visited by many students, staff and visitors, it is not guaranteed that these individuals visit it on a daily basis. This would heavily affect their familiarity with the food service ware distributed there. At residences like Vanier and Totem, the students who live there change from year to year, which decreases familiarity with food service ware items used at their dining halls. The food service ware types are more consistent within the cafés and bistros managed by UBC Food Services. The higher correct sorting rates can be attributed to this consistency, as people are most likely more familiar with items from these locations.

Menzer et al. (2014) also noticed that plastic bags and the availability of single receptacle garbage cans discouraged people from sorting their waste correctly. As noticed during this project, individuals tend to group all their waste items into plastic bags and throw the bags away as single units. Although many of UBC's single garbage cans have been removed,

garbage cans that are located in-house at some food services and outdoors will still cause people to incorrectly sort their compostable and recyclable items.

It would also be ideal to improve signage at Sort it Out stations, ensure that bins are accessible to handicapped members of the public and ensure that bin hole sizes are adequately sized to fit a variety of items. Signage at the Sort it Out bins currently covers a few items in the form of basic icons. The icons and supporting text ought to be larger so that people can start thinking about how they will sort their items before they get to the bins. The signage also doesn't include items like straws or cardboard, which means people need to use their own judgement on where these items ought to go. The question assigned to the garbage stream, "STOP Is that really garbage?", also requires the public to know what UBC Campus and Community Planning considers garbage. It is a subjective question because different people have variable understandings of what they consider as "garbage". It would be much more helpful if the sign at the garbage bins included visuals of items that confirmed which items UBC Campus and Community Planning categorizes as garbage.

The Sort it Out stations are currently tall enough to house large square disposal bins but the current height might not be fully functional for shorter people like children and individuals that use wheelchairs. These people may not be able to see the signage on top of the bins at the back or reach the holes on top.

Incorrect sorting rates could also indicate that though signage is a key strategy to help people sort, it shouldn't be the only way correct sorting practices are communicated to them. Sometimes individuals will be distracted as they dispose their waste, therefore other educational tools should be available to increase overall comprehension of correct waste sorting practices.

## **8.0 RECOMMENDATIONS**

In response to the findings from the food service ware surveys and targeted spot audits, the following food service ware management plan is recommended to improve waste sorting at UBC's Vancouver campus over the next two years.

The plan has the following goals:

1. Make service policies
2. Increase the use of reusable/washable ware wherever possible and increase the breadth of compostable materials on campus
3. Increase awareness and competence of correct waste sorting practices
4. Test compostability of new and prospective products
5. Monitor waste sorting practices on campus
6. Develop and implement a proper documentation and data management system

### **8.1 Making service policies**

Service policies will provide a formal statement that in operating all their food outlets, UBC will use food service ware that can either be recyclable or compostable and that will be compatible with the campus and regional processing systems. Publishing these policies will explain to staff, students and visitors why specific choices and actions need to be made in the future. They will help guide decision-making throughout the entire campus.

#### **8.1.1 Disposable food service ware procurement guidelines**

UBC Sustainability and Campus and Community Planning set many of the campus's sustainability goals and facilitate related public engagement initiatives. Campus and Community Planning intends to provide the campus with a set of guidelines that will help food services select appropriate food service ware items. The current version of UBC's Food Service Ware Guideline (Appendix A) offers food service staff and management information about preferred characteristics and acceptable food service ware items to include as well as which types of items to avoid. The results from this project will assist in the reformatting of the current guidelines.



The following tables are an improved set of disposable food service ware guidelines that address each type of item separately to minimize confusion.

**Table 9** – Revised procurement guidelines for disposable cups and other drink containers  
(adapted from Appendix A, May 2016)

<b>Type of item</b>	<b>Preferred</b>	<b>Acceptable</b>	<b>Avoid</b>
Hot drink cups	<ul style="list-style-type: none"> <li>• Certified* compostable paper or other fibre (plain, uncoated paper)</li> <li>• Coated paper cups**</li> </ul>	Recyclable plastic (marked with recycling symbol and number 1-5)	<ul style="list-style-type: none"> <li>• Expanded polystyrene</li> <li>• Composite items**</li> </ul>
Hot drink lids	Recyclable plastic (marked with recycling symbol and number 1-5)	N/A	<ul style="list-style-type: none"> <li>• Compostable plastic items</li> <li>• Unmarked plastic</li> </ul>
Cold drink cups and containers	Certified* compostable paper or other fibre (plain, uncoated paper)	<ul style="list-style-type: none"> <li>• Recyclable plastic (marked with recycling symbol and number 1-5)</li> <li>• Glass and metal deposit containers</li> </ul>	<ul style="list-style-type: none"> <li>• Expanded polystyrene</li> <li>• Plastic-coated paper</li> <li>• Composite items**</li> <li>• Compostable plastic items</li> </ul>
Cold drink cup lids	Recyclable plastic (marked with recycling symbol and number 1-5)	N/A	<ul style="list-style-type: none"> <li>• Compostable plastic items</li> <li>• Unmarked plastic</li> </ul>

\* Certified compostable means certified by Biodegradable Products Institute (BPI), BSI Biodegradable Solutions and other recognized standards

\*\* Coated paper coffee cups are recyclable at UBC

\*\*\* Composite items are products that are made from more than one type of material (For example: plain paper and plastic film)

N/A = Not applicable

**Table 10** – Revised procurement guidelines for disposable food service ware  
(adapted from Appendix A, May 2016)

<b>Type of item</b>	<b>Preferred</b>	<b>Acceptable</b>	<b>Avoid</b>
Bowls (e.g. soup, rice, noodles)	Certified* compostable paper or other fibre (plain, uncoated paper)	Recyclable plastic (marked with recycling symbol and number 1-5)	<ul style="list-style-type: none"> <li>• Expanded polystyrene</li> <li>• Plastic-coated paper</li> <li>• Composite items**</li> <li>• Compostable plastic items</li> </ul>
Bowl lids	Recyclable plastic (marked with recycling symbol and number 1-5)	N/A	<ul style="list-style-type: none"> <li>• Unmarked plastic</li> <li>• Compostable plastic items</li> <li>• Composite items**</li> </ul>
Food take-out containers	Certified* compostable paper or other fibre (plain, uncoated paper)	Recyclable plastic (marked with recycling symbol and number 1-5)	<ul style="list-style-type: none"> <li>• Expanded polystyrene</li> <li>• Plastic-coated paper</li> <li>• Composite items**</li> <li>• Compostable plastic items</li> </ul>
Plates	Certified* compostable paper or other fibre (plain, uncoated paper)	N/A	<ul style="list-style-type: none"> <li>• Expanded polystyrene</li> <li>• Plastic-coated paper</li> <li>• Composite items**</li> <li>• Compostable plastic items</li> </ul>
Boxes and trays	Certified* compostable paper or other fibre (plain, uncoated paper)	N/A	<ul style="list-style-type: none"> <li>• Expanded polystyrene</li> <li>• Plastic-coated paper</li> <li>• Composite items**</li> <li>• Compostable plastic items</li> </ul>
Paper wrappers/sleeves (e.g. sandwiches, burritos, wraps)	Certified* compostable paper or other fibre (plain, uncoated paper)	Chequered Poly Lactic Acid-coated paper	<ul style="list-style-type: none"> <li>• Plastic-coated paper</li> <li>• Aluminum foil</li> <li>• Waxed paper</li> <li>• Composite items**</li> </ul>

\* Certified compostable means certified by Biodegradable Products Institute (BPI), BSI Biodegradable Solutions and other recognized standards

\*\* Composite items are products that are made from more than one type of material (For example: plain paper and plastic film)

N/A = Not applicable

**Table 11** – Revised procurement guidelines for disposable cutlery and other eating utensils (adapted from Appendix A, May 2016)

<b>Type of item</b>	<b>Preferred</b>	<b>Acceptable</b>	<b>Avoid</b>
Forks, knives and spoons	<ul style="list-style-type: none"> <li>• Certified* compostable wood, bamboo or fibre</li> <li>• Plain, uncoated wood or bamboo</li> </ul>	Recyclable plastic (marked with recycling symbol and number 1-5)	<ul style="list-style-type: none"> <li>• Compostable plastic items</li> <li>• Unmarked plastic</li> </ul>
Chopsticks	<ul style="list-style-type: none"> <li>• Certified* compostable wood, bamboo or fibre</li> <li>• Plain, uncoated wood or bamboo</li> </ul>	N/A	<ul style="list-style-type: none"> <li>• Plastic-coated products</li> <li>• Unmarked plastic</li> </ul>

\* Certified compostable means certified by Biodegradable Products Institute (BPI), BSI Biodegradable Solutions and other recognized standards  
 N/A = Not applicable

**Table 12** – Revised procurement guidelines for miscellaneous disposable food service items (adapted from Appendix A, May 2016)

<b>Type of item</b>	<b>Preferred</b>	<b>Acceptable</b>	<b>Avoid</b>
Straws	To be determined	• Unmarked plastic	• Compostable plastic items
Stir sticks	<ul style="list-style-type: none"> <li>• Certified* compostable wood, bamboo or fibre</li> <li>• Plain, uncoated wood or bamboo</li> <li>• Fettucini noodles</li> </ul>	N/A	<ul style="list-style-type: none"> <li>• Compostable plastic items</li> <li>• Unmarked plastic</li> </ul>
Napkins	Certified* compostable paper or other fibre (plain, uncoated paper)	N/A	N/A
Bags	Certified* compostable paper or other fibre (plain, uncoated paper)	N/A	<ul style="list-style-type: none"> <li>• Compostable plastic items</li> <li>• Unmarked plastic</li> </ul>

\* Certified compostable means certified by Biodegradable Products Institute (BPI), BSI Biodegradable Solutions and other recognized standards  
 N/A = Not applicable

In addition to providing these procurement guidelines, it would also be helpful to include notes on which brands and products are generally preferred choices accompanied with pictures of approved items by Campus and Community Planning. They should be acceptable products already in use on campus and familiar to the campus population. This would help food service management and staff find easy alternatives efficiently without having to do their own research. Each item included in the guideline should include a symbol that indicates which sorting stream it must be thrown into. The guideline should also explain why particular types of products including compostable or biodegradable plastics and composite products are not suitable for UBC's waste sorting system. The guideline in Appendix A indicates that certified compostable products are accepted on campus but as seen with many of the plastic products from Eco Products, though they are certified as compostable, they would cause contamination in the campus composting stream. Please refer to Appendix H for an adapted version of the procurement guidelines for food take-out containers where all these additional aspects are applied. The final version of the procurement guidelines would include all items covered in Tables 9 to 12 with similar formatting as that displayed in Appendix H. When the final version of the guideline is completed, it should be distributed to all food service outlets and released online to ensure it is highly accessible to stakeholders.

### **8.1.2 Other proposed policies**

To compliment the release of the disposable food service ware procurement guidelines, Campus and Community Planning could develop a system that tests and documents current and prospective products to ensure they are compatible with the local in-vessel composter. The campus could also develop a set of technical guidelines prescribing how in-house sorting bins ought to look like to align with the campus's Sort it Out waste system. The following aspects should be considered: number of sorting bins included, signage and colour coding. As UBC leases out commercial spaces to food services, it would be beneficial to make a policy that gives Campus and Community Planning the right to request that businesses stop using certain food service ware items or in-house disposal bins. This circumstance would be applicable if UBC collects their waste, if the items cause confusion among customers and if they cause contamination at sorting stations. Currently, Metro Vancouver has no authority to tell businesses what food service ware items to use. They offer guiding information on their website and state that businesses need to confirm with their waste collectors as well as regional recycling and composting facilities whether or not items are acceptable (personal communication with Andrew Marr on March 18th 2016). Since UBC supplies waste collection services to businesses within main campus limits and operates the in-vessel composter on South Campus, it must have more authority over what they collect.

## **8.2 Reusable food service ware and the breadth of compostable items**

The Results section (section 6.1) identified 10 food service locations that offer reusable plates, cups, bowls and cutlery. It is recommended that current and prospective food services also consider the use of reusable ware, as this would ultimately reduce the amount of waste entering UBC's waste collection system. Since compostable and biodegradable plastics are not compatible with UBC's composting system and composting facilities in the Metro Vancouver region, it is recommended that UBC's food service staff and management phase out the use of these products to minimize confusion and contamination at the Sort it Out stations. All plastic bags could be replaced with paper bags to decrease the amount of bags thrown into the garbage and encourage the public to sort their waste. Once Campus and Community Planning releases their disposable food service ware procurement guidelines, it is recommended that food service staff and management review and revise their food service ware inventories and replace problematic items with more recognizable recyclable and compostable products. This should be done in consultation with Campus and Community Planning that can offer the appropriate support, information and resources. If staff are not sure whether a food service ware item is acceptable or not, they must check with UBC Sustainability or UBC Waste Management to ensure it will not cause contamination in composting and recycling streams. Even though an item meets ASTM 6400 requirements for compostability, it might not be suitable for processing in local composting facilities since they may use different equipment, technologies and methodology. As a result, acceptability varies from city to city.

It is also recommended that food services make a long-term goal of reducing the number of food ware types that they use and increasing the breadth of compostable materials used provided they are acceptable at local facilities. Reducing the diversity in food service ware products would help the public become familiar with items faster and sort them correctly on a consistent basis. It would also be ideal for UBC Food Services, the AMS and the independently-run food services to share product-specific information and consolidate which items are purchased across the main campus. Offering a larger breadth of compostable food service ware items would allow users to group their items together and decrease the amount of food contamination in the recyclable containers sorting stream. Items such as coffee cup sleeves and straws could be further phased out of inventories to increase waste reduction in the future.

## **8.3 Increasing awareness and competence of correct waste sorting practices**

### **8.3.1 Communication with the public**

It is recommended that UBC Sustainability continue to communicate with the campus about how to correctly sort items at Sort it Out stations. UBC Sustainability could equip the campus with tools to assist the public appropriately sort waste. The City of Vancouver's interactive Waste Wizard is a notable example as it allows a user to search for a type of item and provides instructions on which sorting stream the item ought to be placed into. Also, a promotional video briefly outlining how to sort the campus's food service ware items would help teach students, staff and visitors how to properly sort waste and

familiarize them with the types of items at UBC food outlets. Videos and other online marketing strategies would make it easier to rapidly raise awareness about the campus’s waste sorting system and any changes that would occur through social media.

### 8.3.2 Consistency in waste sorting infrastructure

Another way to ensure proper awareness of the Sort it Out system is to establish consistency in infrastructure throughout the campus. This would ultimately increase public familiarity of the system. Since single garbage cans are still available outdoors and in some buildings on campus, it is recommended that UBC Building Operations continue to replace these receptacles with one type of Sort it Out station. It is also suggested that the colour coding at these stations and the appearance of these stations be as consistent as possible to help students, staff and visitors gain familiarity with the campus sorting system. Waste collection staff should also be trained how to properly sort waste according to the four streams and empty sorting bins more frequently during peak lunch hours to avoid incorrect sorting at stations. As another longer-term goal, food services with single in-house garbage cans must eventually provide recycling bins and compost bins with appropriate waste pick-ups through UBC Waste Management. Table 13 summarizes food outlets that either have single in-house garbage cans or sorting stations that don’t match UBC’s Sort it Out system.

**Table 13** – Summary of in-house sorting stations that do not match UBC’s Sort it Out system.

<b>Food service location</b>	<b>Description of issue</b>
Starbucks on East Mall and Agronomy Road	This Starbucks currently has two in-house stations. Both have two unlabelled bins in which all waste is thrown.
Tim Horton’s in the Forest Sciences Building	The current sorting station has two bins designated for bottles and other recyclables, one for garbage and another one for compostable items, which isn’t used (it is permanently covered by a plastic food tray). This sorting station does have Sort it Out signage but would benefit from larger signs that are more visible and recognizable to customers.
QOOLA in the Nest	The current sorting station has two bins: <ul style="list-style-type: none"> <li>• One designated for compostable, biodegradable and recyclable items (smoothie cups and lids, coffee cups, paper plates, napkins, yogurt cups and lids, sample yogurt cups and all biodegradable eating utensils)</li> <li>• A second bin designated for “trash” such as smoothie straws</li> </ul>
Uppercase, Lowercase, Flip Side and The Delly in the Nest	These food services in the Nest have single garbage receptacles at their condiments sections but would allow for the collection of all items provided by each respective location.

#### **8.4 Testing compostability of new and prospective products**

As discussed in section 8.1.2, it is recommended that Campus and Community Planning develop a standard operating procedure (SOP) to test and document current and prospective compostable products to ensure they are compatible with the local in-vessel composter on South Campus. The SOP would describe how the test would be done and include the following details:

- Who or which staff members would conduct the tests
- Outline the training that is needed to conduct the tests
- Describe how many samples of a particular product will be needed for the test
- The length of the test period
- Define how compostability and acceptability will be determined

All tests would be conducted at the composter on South Campus and proper training would be provided to ensure all tests are done consistently.

#### **8.5 Monitoring waste sorting practices on campus**

In order to determine how all the proposed changes are affecting the campus waste management system, Campus and Community Planning will need to monitor food service ware procurement and waste sorting practices through waste composition audits. It is recommended that UBC keep track of the most commonly incorrectly sorted food service ware items, the quality of compost product generated from the in-vessel composter, and which items are degrading the compost quality. This will enable Campus and Community Planning to evaluate the campus's performance and make further improvements that are necessary to achieve its policies and waste diversion goals.

## 8.6 Documentation and data management system

To properly implement this food service ware management plan, the following documents and records described in Table 14 will need to be retained for future reference with an online data management system. This is not an exhaustive list and includes the major documents or records that are relevant to this project.

**Table 14** – Summary of documents and records needed for the food service ware management plan.

<b>Document/Record</b>	<b>Description</b>
Current policies	Current policies will be available online for campus staff, students and the general public to access. The policies will cover all aspects that pertain to food service ware procurement and waste collection at Sort it Out stations. The most relevant ones are: the food service ware procurement guidelines, food service policies, the campus sorting guide and technical guidelines regarding Sort it Out stations.
Non-compostability reports	As UBC tests which food service ware products are compatible with the in-vessel composter on South Campus, non-compostability reports will need to be provided to all food service management to inform them that certain products should not be purchased and explain why the products are not acceptable.
Waste composition audit reports and progress reports	Waste audit reports and progress reports will detail UBC's performance in reducing its waste and achieving optimal waste sorting practices. They will each describe overall waste diversion rates and composition of contaminants found as well as any modifications that need to be added to the waste management system as a whole.
Inventory lists from all food service locations	Updated inventory lists will need to be documented to keep track of costs and food service ware needs at all outlets. This will also keep Campus and Community Planning informed on how much food service ware and what types of food service ware are entering the UBC waste system on a monthly and annual basis.



## 9.0 CONCLUSION

UBC is making significant strides towards its goal of diverting 80% of its waste by the year 2020. Its implementation of the Sort it Out program and elimination of expanded polystyrene use throughout the main campus demonstrates the campus's capacity for post-consumer waste sorting and overall waste reduction. In support of this campus-wide commitment, this project successfully identified what types of food service ware are used at the university's food outlets and outlined how the institution can further improve its waste sorting efforts. It provides UBC's management with the data needed to select food service ware that students, staff and visitors can easily sort without confusion. It is recommended that university staff continue to communicate and engage with the rest of the community to raise awareness of the environmental implications of proper waste sorting practices.

Selecting the most appropriate food service ware products for the UBC Vancouver campus will require balancing energy and materials costs, social and environmental consciousness, environmental regulations, compatibility with local processing facilities, product performance and customer satisfaction. Purchasing compostable and recyclable products is one aspect of the solution, as it needs to be accompanied by public education and outreach as well as ensuring that the Metro Vancouver region has the infrastructure to compost or recycle products at the end of their intended use. Achieving UBC's 2020 waste reduction target of 80% will require the cooperation and open-mindedness of students, faculty and food service staff as well as the awareness that all members of the university's population have an important role to play in ensuring that this target is attained.

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## **APPENDICES**

# Appendix A – UBC’s tentative Food Service Ware Guideline

## UBC Food Service Ware Guideline

The best option for reducing waste is **reusable** food and drink containers including mugs, plates, cutlery etc.

For **single use** food containers and cutlery, the preferred choices below allow easier sorting by customers and by composting and recycling facilities, less contamination of compost with non-compostable materials, and less contamination of recyclables with food. Preferred products are:

- Compostable, fibre-based (e.g., wood, paper or bamboo) products for all **food** items
- Recyclable products for all **drink** containers.

\*Please **avoid** products made of “**compostable plastic**” as these are not compatible with UBC’s composting system\*

### Single Use Product Guideline

Category	Preferred	Acceptable	Avoid
Food plates and bowls	<ul style="list-style-type: none"> <li>▪ Certified* compostable paper or other fibre (plain, uncoated paper)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Other certified compostable materials</li> <li>▪ Recyclable plastic (marked with recycling symbol &amp; number 1-5)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Styrofoam</li> <li>▪ Plastic coated paper plates</li> </ul>
Food utensils & cutlery	<ul style="list-style-type: none"> <li>▪ Certified compostable wood, bamboo or fibre</li> <li>▪ Plain, uncoated wood or bamboo</li> </ul>	<ul style="list-style-type: none"> <li>▪ Recyclable plastic (marked with recycling symbol and number 1-5)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Non-recyclable or unmarked</li> <li>▪ Compostable plastic</li> </ul>
Food wrappers, bags (e.g., sandwich or pita wrapper)	<ul style="list-style-type: none"> <li>▪ Certified compostable paper</li> <li>▪ Plain, uncoated paper</li> </ul>	<ul style="list-style-type: none"> <li>▪ Plastic film (clean only, where soft plastics recycling is available)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Non compostable coated paper, waxed paper</li> <li>▪ Paper/plastic composites, paper bags with plastic windows</li> </ul>
Drink containers and cups	<ul style="list-style-type: none"> <li>▪ Recyclable plastic (marked with recycling symbol &amp; number 1-5)</li> <li>▪ Glass and metal deposit containers</li> <li>▪ Coated paper coffee cups**</li> </ul>	<ul style="list-style-type: none"> <li>▪ Other recyclable containers</li> <li>▪ Compostable paper or fibre-based cups</li> </ul>	<ul style="list-style-type: none"> <li>▪ Styrofoam</li> <li>▪ Compostable plastic</li> </ul>
Other containers, boxes and trays	<ul style="list-style-type: none"> <li>▪ Plain, uncoated cardboard/paper</li> <li>▪ Certified compostable fibre</li> </ul>	<ul style="list-style-type: none"> <li>▪ Recyclable plastic (marked with recycling symbol and number 1-5)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Non-recyclable or unmarked</li> <li>▪ Compostable plastic</li> </ul>

\*Certified compostable means certified to BPI, CCME/BNQ (see logos to the right) or other recognized *compostable* standards (different than *biodegradable*). Many certified products are now readily available. If a product is biodegradable, it must also be certified compostable in order to be accepted on campus.

\*\*Coated paper coffee cups are recyclable at UBC.



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26 March 2015

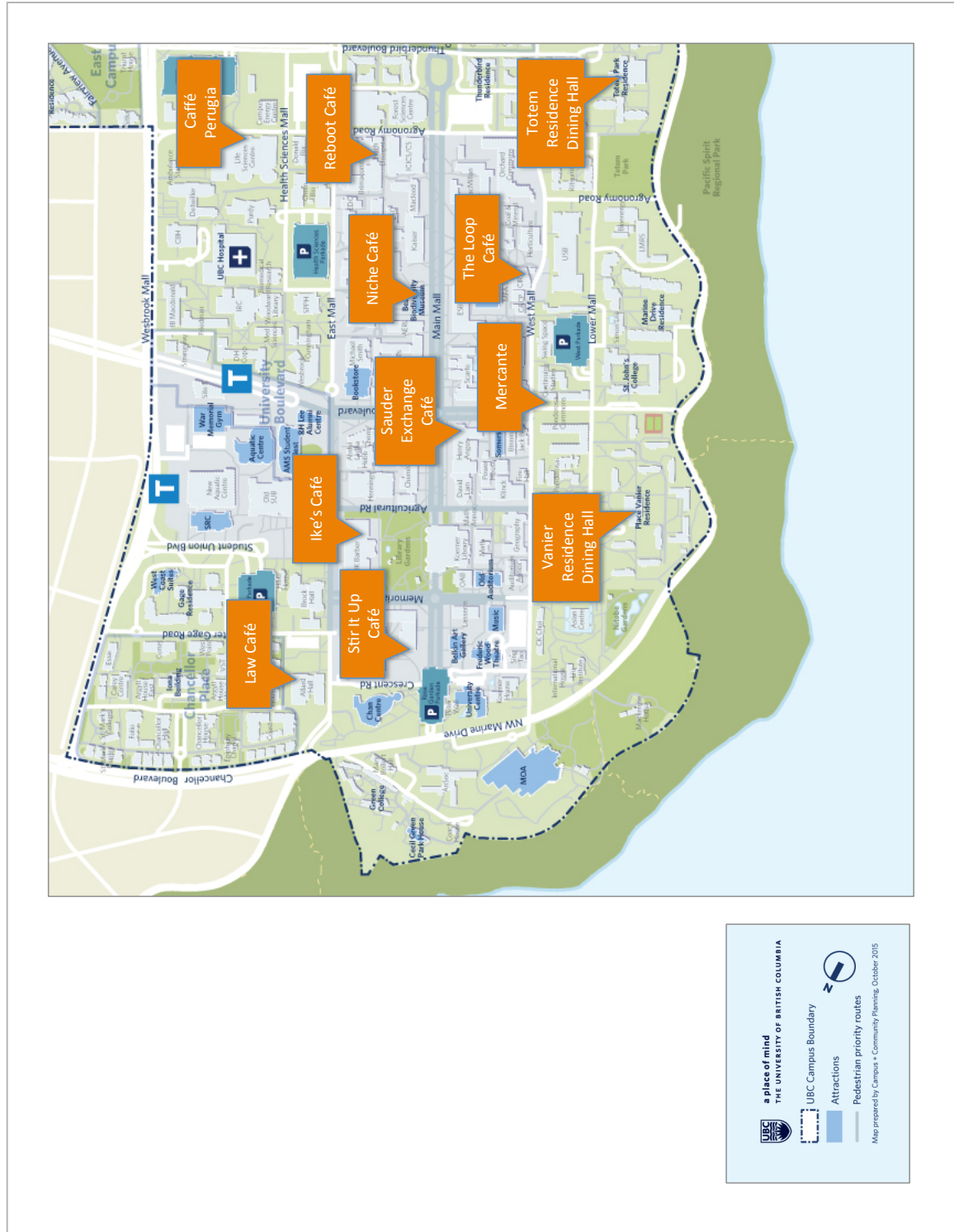
## Appendix B – Baseline Sustainability Criteria for “Preferred” Biobased Products (Health Care Without Harm, 2010)

Criteria	Rationale
1. 100 percent biobased carbon content: no fossil fuel-based materials used in product including coatings	Most biobased food service ware marketed today do not contain fossil fuel based content, though some paper and fiber products are coated with plastic. It is possible to produce food service ware with 100 percent biobased carbon content including coatings.
2. No highly hazardous additives, including both additives mixed into the product and surface treatments: <ul style="list-style-type: none"> <li>▪ No persistent, bioaccumulative, toxics (PBTs)</li> <li>▪ No carcinogens</li> <li>▪ No reproductive/developmental toxicants</li> <li>▪ No organohalogen-based chemicals (bromine, chlorine, fluorine or iodine)<sup>l</sup></li> <li>▪ No endocrine disruptors</li> </ul> <small>*See Resources section for reference chemical lists.</small>	Many chemicals are approved for use as additives in food service ware to achieve certain properties such as heat, water and grease resistance. Some of these chemicals are considered highly hazardous—they have the potential to be released into the environment via manufacture, use and disposal and scientific data tests show that they persist in the environment, bioaccumulate in animals or humans and/or are toxic to animals or humans.
3. No engineered nanomaterials <sup>3</sup> added	The behavior and characteristics of nanoparticles in materials and living organisms is often unique and unpredictable. To date nanomaterials have not been subject to thorough testing for risks to human health and the environment. Until nanomaterials are subject to comprehensive hazard and exposure assessments that include evaluations of their behavior in the environment, how people and wildlife may be exposed, persistence, bioaccumulation and toxicity, we recommend against their use in biobased materials.
4. No chlorine or chlorine compounds used in production	Bleaching of paper using chlorine or chlorine compounds generates dioxins, a group of chemicals known to bioaccumulate in humans and persistent in the environment thus contributing to pollution of the food chain. EPA considers dioxin a probable human carcinogen. Bleaching is not necessary to produce a functioning product and safer alternatives exist.
5. Certified compostable by an acceptable certification organization or program: <ul style="list-style-type: none"> <li>▪ Biodegradable Products Institute (US)</li> <li>▪ AIB Vincotte Inter (Belgium)</li> <li>▪ Australian Environmental Labeling Association</li> <li>▪ Biodegradable Plastics Society (Japan)</li> <li>▪ DIN CERTCO (European Union)</li> <li>▪ Cedar Grove Composting</li> <li>▪ Lab results from an American Society for Testing and Materials (ASTM) approved lab</li> </ul>	Certification of compostability—the ability of a given product to fully biodegrade in a <i>commercial</i> compost facility—not only increases the likelihood that a facility will accept these products, but also assures that products do not exceed limits on heavy metal content. Programs in other countries give stronger assurance of safety than the U.S standard as they place stricter limits on heavy metal content. [Note: These certifications do not mean that a product will fully biodegrade in home composting or non-commercial scale facilities.]
6. GMO-free <sup>m</sup> or use of genetically engineered (GE) feedstock is offset through purchase of non-GE feedstock: Certified GMO-free, Identity Preserve, <sup>n</sup> GMO-offsets, <sup>o</sup> Working Landscape Certificates <sup>q</sup>	Genetically engineered feedstocks are not adequately assessed for their credible adverse effects on human or animal health or on the environment in which they are produced. <sup>13</sup>
<b>Additional criteria for wood-based feedstock (paper):</b>	
7a. Non-food contact items: must contain 100 percent post-consumer recycled content (pre- or post-consumer)	Disposables made from 100 percent virgin wood fiber unnecessarily deplete forest resources. Pre-consumer waste (leftover from the manufacturing process) and post-consumer waste (materials used by consumers and reclaimed) both displace use of virgin wood fiber.
7b. Food contact items: <ul style="list-style-type: none"> <li>i. Hot beverage cups: must have a minimum of 10 percent post-consumer recycled content</li> <li>ii. All other food contact items must contain 100 percent recycled content (pre- or post-consumer)</li> </ul>	For safety reasons, federal regulations place some restrictions on, but do not ban as is often claimed, the use of post-consumer recycled paper pulp in materials that will come in contact with food. At least one paper mill produces pulp from post-consumer waste that can be used to make these products.

## Appendix C – Beyond Baseline Sustainability Criteria for “More Preferred” Biobased Products (Health Care Without Harm, 2010)

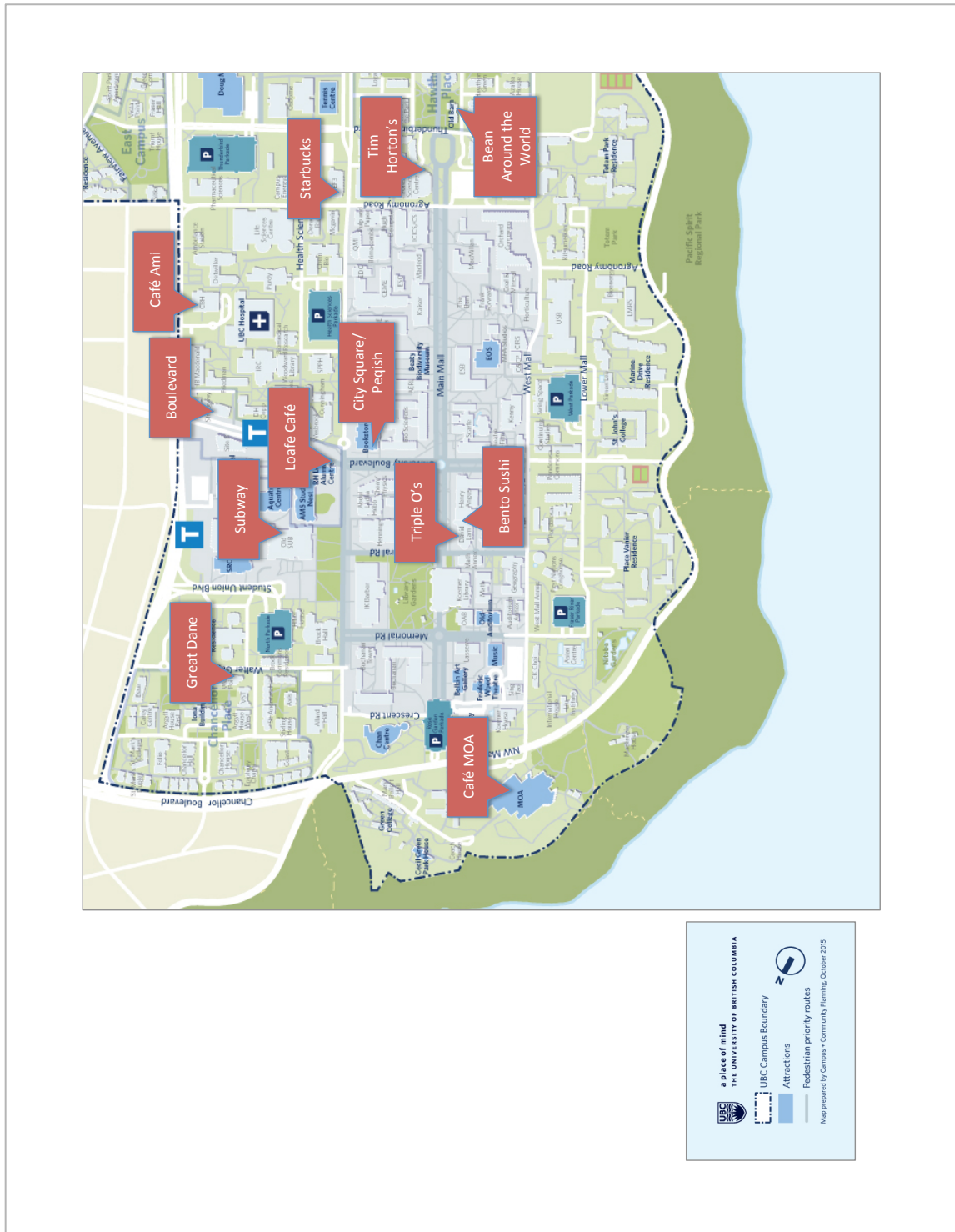
Sustainable Feedstock Criteria	Rationale
1. GMO-free	While offsets support the production of GMO-free feedstock, certified GMO-free is most preferable.
2. Feedstock and final product are produced in North America	<ul style="list-style-type: none"> <li>▪ Long distance shipping of materials and products requires considerable energy and contributes to green house gas emissions, air pollution and human illness such as cancer and respiratory disease.<sup>14</sup></li> <li>▪ Labor conditions and livable wages are not always ensured in countries where some biobased feedstock and products are produced.</li> <li>▪ The demand for biodiesel has already resulted in rainforest destruction in other parts of the world.</li> </ul>
If agricultural feedstock	
3. Sustainably grown <sup>11</sup> with preference for utilizing non-food agricultural resources including: perennial biomass crops and sustainably harvested residues	Conventional agriculture relies heavily on pesticides and fertilizers and excessive water use and contributes to soil erosion and loss of wildlife habitat.
If wood-based feedstock (paper)	
4a. Forest Stewardship Council (FSC) certified virgin content (and no chlorine or chlorine compounds used in production per the baseline criteria)	Harvesting of wood fiber for paper pulp can contribute to loss of wildlife habitat, soil erosion, and degradation of nearby water bodies. FSC certification provides some assurance that wood is harvested in more sustainable and socially responsible ways i.e. without genetic engineering.
4b. Recycled content non-food contact items must be 100 percent post-consumer recycled content	Using post-consumer recycled content provides markets for materials separated for recycling consumers, thus the preferability of a product increases as post-consumer content increases.
4c. Recycled content food contact items: i. Hot cups must have minimum 30 percent post-consumer recycled content ii. All other food contact items must be 100 percent recycled content with minimum of 30 percent post-consumer recycled content	
Additional Criteria	Rationale
5. Biodegradable in Marine Environment: meets the standard for biodegradability in the marine environment (ASTM D7081-05)	This standard only applies to non-floating biodegradable plastics. There is no standard for floating plastics at this time, though floating plastics are a major part of ocean debris.
6. Clearly labeled as compostable	This is especially important if food service ware will be composted along with food waste.
7. Additives must be comprehensively tested for the hazards they pose to human health and the environment: tested for persistence, bioaccumulation and toxicity.	The vast majority of chemicals used in commerce have not been adequately tested to determine human and environmental health impacts—“EPA’s analysis found that no basic toxicity information, i.e., neither human health nor environmental toxicity, is publicly available for 43 percent of the high volume chemicals manufactured in the US and that a full set of basic toxicity information is available for only 7 percent of these chemicals.” <sup>15</sup>

**Appendix D – Map of the cafés and bistros operated by UBC Food Services that were surveyed. Map of UBC modified March 2016.**





**Appendix E – Map of the independently-run and chain food outlets that were surveyed. Map of UBC modified March 2016.**



**Appendix F – Food service ware survey completed at designated food outlets throughout campus (listed in section 5.2).**

**Food Outlet Service Ware Survey**

Food outlet name: \_\_\_\_\_

Date: \_\_\_\_\_ Time: \_\_\_\_\_

**A. Hot drink cups**

- Certified Compostable paper or other fibre
- Recyclable Plastic (marked with a recycling number)
- Conventional coated paper
- Compostable Plastic
- Unmarked Plastic
- Expanded Polystyrene

Product name(s)

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**B. Hot drink lids**

- Certified Compostable paper or other fibre
- Recyclable Plastic (marked with a recycling number)
- Conventional coated paper
- Compostable Plastic
- Unmarked Plastic
- Expanded Polystyrene

Product name(s)

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**C. Cold drink cups**

- Certified Compostable paper or other fibre
- Recyclable Plastic (marked with a recycling number)
- Conventional coated paper
- Compostable Plastic
- Unmarked Plastic
- Expanded Polystyrene

Product name(s)

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**D. Cold drink lids**

- Certified Compostable paper or other fibre
- Recyclable Plastic (marked with a recycling number)
- Conventional coated paper
- Compostable Plastic
- Unmarked Plastic
- Expanded Polystyrene

Product name(s)

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**E. Bowls (e.g. soup, rice, noodles)**

- Certified Compostable paper or other fibre
- Recyclable Plastic (marked with a recycling number)
- Conventional coated paper
- Compostable Plastic
- Unmarked Plastic
- Expanded Polystyrene

Product name(s)

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**F. Bowl lids**

- Certified Compostable paper or other fibre
- Recyclable Plastic (marked with a recycling number)
- Conventional coated paper
- Compostable Plastic
- Unmarked Plastic
- Expanded Polystyrene

Product name(s)

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**G. Food take-out containers**

- Certified Compostable paper or other fibre
- Recyclable Plastic (marked with a recycling number)
- Conventional coated paper
- Compostable Plastic
- Unmarked Plastic
- Expanded Polystyrene

Product name(s)

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**H. Plates**

- Certified Compostable paper or other fibre
- Recyclable Plastic (marked with a recycling number)
- Conventional coated paper
- Compostable Plastic
- Unmarked Plastic
- Expanded Polystyrene

Product name(s)

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**I. Boxes and Trays**

- Certified Compostable paper or other fibre
- Recyclable Plastic (marked with a recycling number)
- Conventional coated paper
- Compostable Plastic
- Unmarked Plastic
- Expanded Polystyrene

Product name(s)

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**J. Utensils (forks, knives, spoons)**

- Plain wood or bamboo
- Recyclable Plastic (stamped with a recycling number)
- Coated wood or bamboo
- Compostable Plastic
- Unmarked Plastic
- Other (specify) \_\_\_\_\_

Product name(s)

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**K. Chopsticks**

- Plain wood or bamboo
- Recyclable Plastic (stamped with a recycling number)
- Coated wood or bamboo
- Compostable Plastic
- Unmarked Plastic
- Other (specify) \_\_\_\_\_

Product name(s)

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**L. Straws**

- Recyclable Plastic (stamped with a recycling number)
- Compostable Plastic
- Unmarked Plastic
- Other (specify) \_\_\_\_\_

Product name(s)

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**M. Wrappers (e.g. Sandwiches, burritos)**

- Plain paper
- Certified compostable paper
- Plastic or wax coated paper
- Other (specify) \_\_\_\_\_

Product name(s)

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**N. Napkins**

- Plain paper
- Certified compostable paper

Product name(s)

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**O. Other item:** \_\_\_\_\_

Material(s) \_\_\_\_\_

Product name(s)

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**P. Other item:** \_\_\_\_\_

Material(s) \_\_\_\_\_

Product name(s)

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**Q. Other item:** \_\_\_\_\_

Material(s) \_\_\_\_\_

Product name(s)

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**Appendix H – Proposed formatting for disposable food service ware guidelines as applied to food take-out containers (adapted from Appendix A, April 2016).**

## Food Take-Out Containers

Preferred	Acceptable	Avoid
<ul style="list-style-type: none"> <li>• Certified* compostable paper or other fibre (plain, uncoated paper)</li> </ul>	<ul style="list-style-type: none"> <li>• Recyclable plastic (marked with recycling symbol and number 1-5)</li> </ul>	<ul style="list-style-type: none"> <li>• Expanded polystyrene</li> <li>• Plastic-coated paper</li> <li>• Composite items**</li> <li>• Compostable/biodegradable plastic items</li> </ul>

\* Certified compostable means certified by Biodegradable Products Institute (see logo to the right), BSI Biodegradable Solutions and other recognized standards  
 \*\* Composite items are products that are made from more than one type of material (For example: plain paper and plastic film)

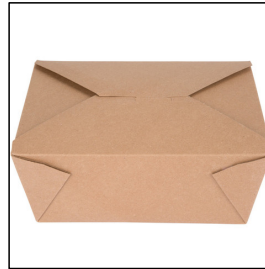


**Preferred items:**



**Compostable clamshell** ©

Product brand and name  
 Catalogue number



**Pack To Go containers** ©

Product brand and name  
 Catalogue number

**Items to avoid:**



**Poly Lactic Acid (PLA) "biodegradable" clamshell** ☹

Product brand and name  
 Catalogue number

**FAQ: Why should I avoid purchasing this product and other products that are similar?**

Plastic items marked "compostable" or "biodegradable" are not accepted in campus or regional composting facilities and are considered as contaminants because they do not completely break down. Contamination will degrade the quality of the finished compost.

Symbol legend: © - Compostable ☹ - Garbage

**Note:** ® would represent items that correspond with the Recyclable Containers bins