City of Bexley

ZERO WASTE PLAN

ZWP

www.bexley.org/zero

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City of Bexley
ZERO WASTE PLAN

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In Appreciation:

The development of this Zero Waste Plan was possible with the help of many individuals, organizations, institutions, and companies. This includes:

- The Solid Waste Authority of Central Ohio (SWACO) for providing funding through their grant program.
- The Mayor of Bexley for his support of the project and guidance with the Green Team.
- City Council's support of the project and application to SWACO.
- The City Service Director's support in the development of the project and the application process with SWACO.
- The Green Team members for their commitment to waste diversion and environmental sustainability. This Zero Waste Plan took many hours of meetings and review. The value of the input of the Green Team was invaluable and appreciated.

Green Team Members:

Ben Kessler, Mayor
Bill Dorman, Service Director
Mary Gottesman, City Council
Laura Brennankane, Capital University
Betty Brown, Resident
Laura Robertson-Boyd, Resident
John Eikenberry, Bexley City Schools
Julie Eikenberry, Columbus School for Girls
Taylor Greely, Rumpke Waste Systems
Joanne Grossman, Resident
Kathy Hayden, Resident
Albert Iosue, SWACO
Connie Lewis, Resident
Kim Rankin, Resident
Liz Samuelson, Resident
Margaret Ann Samuels, Resident
Don Skaggs, Bexley Community Garden
Larry Long, Resident
Chrissy Anderson, Capital University
Sarah Brewer, Columbus School for Girls
Michael Daly, Resident

SECTION 1 – INTRODUCTION

Managing solid waste generated by households, (single family, multi-family) commercial businesses, (restaurants, groceries, medical offices, general services, sports complexes) institutions (schools, universities, hospitals and government agencies) and industry (manufacturers of products from steel to automobiles to plastics) is complex. The umbrella that covers who is a waste generator is enormous and working to achieve a roadmap even on a small scale such as a single company, school, university or hospital has many moving parts. Identifying the many issues and key factors to provide decision makers with options and alternatives for safe and effective management of generated waste and diverting it from the landfill is a key component of a Zero Waste Plan (ZWP).

Cities, counties, states and the federal government for several decades have been looking at opportunities to divert waste from landfills. In most cases, the legislatures of the states have enacted solid waste laws that established goals to achieve higher percentages of waste diversion. In Ohio, the Ohio Environmental Protection Agency (Ohio EPA) is responsible for implementing Ohio's solid waste regulations and laws. The Ohio EPA has provided a historical review in their new proposed solid waste plan format Version 4.0 that states:

> "In 1988, Ohio faced a combination of solid waste management problems, including rapidly declining disposal capacity at existing landfills, increasing quantities of waste being generated and disposed, environmental problems at many existing solid waste disposal facilities, and increasing quantities of waste being imported into Ohio from other states. These issues combined with Ohio's outdated and incomplete solid waste regulations caused Ohio's General Assembly to pass House Bill (H.B.) 592. H.B. 592 dramatically revised Ohio's outdated solid waste regulatory program and established a comprehensive solid waste planning process."

State Level

The 1988 Ohio law required each of the 88 counties to either establish a single county solid waste district or join with other counties to form a joint solid waste management district. There are 52 solid waste districts in Ohio. Fifteen of the districts are multi-county and thirty-seven are single county districts.

The law requires a solid waste district to prepare a solid waste plan that meets or exceeds goals identified in a State of Ohio Solid Waste Management Plan. The last plan developed by the state was the *2009 State Solid Waste Management Plan*. The *2009 State Plan* established nine goals that solid waste districts must take into consideration when developing their plans. These include:

1. The SWMD shall ensure that there is adequate infrastructure to give residents and commercial businesses opportunities to recycle solid waste.

2. The SWMD shall reduce and recycle at least 25 percent of the solid waste generated by the residential/commercial sector and at least 66 percent of the solid waste generated by the industrial sector.

3. The SWMD shall provide the following required programs: a Web site; a comprehensive resource guide for recycling; an inventory of available infrastructure; and a speaker or presenter.

4. The SWMD shall provide education, outreach, marketing and technical assistance regarding reduction, recycling, composting, reuse and other alternative waste management methods to identified target audiences using best practices.

5. The SWMD shall provide strategies for managing scrap tires, yard waste, lead-acid batteries, household hazardous waste and obsolete/end-of-life electronic devices.

6. The SWMD shall explore how to incorporate economic incentives into source reduction and recycling programs.

7. The SWMD will use U.S. EPA's Waste Reduction Model (WARM) (or an equivalent model) to evaluate the impact of recycling programs on reducing greenhouse gas emissions.

8. The SWMD has the option of providing programs to develop markets for recyclable materials and the use of recycled-content materials.

9. The SWMD shall report annually to Ohio EPA regarding implementation of the SWMD's solid waste management plan.

Most of these goals have been in place for decades. The solid waste districts have been implementing programs to help achieve and exceed the goals outlined by the State.

The legislature recently revised the membership of the state committee required to update the State Plan and these nine goals. The Materials Management Advisory Council (MMAC) has been meeting over the past six months to begin the process to reprioritize Ohio's goals and objectives and rewrite the Ohio State Solid Waste Management Plan.

County Level

The Solid Waste Authority of Central Ohio (SWACO) is the agency responsible for developing a comprehensive solid waste management plan to meet the regulatory requirements outlined by the State of Ohio and meet the needs of Franklin County residents. SWACO is one of the few solid waste districts that operate transfer facilities and a landfill to manage solid wastes that are not reduced, reused or recycled. SWACO's landfill is one of the largest landfills operating in Ohio and one of the largest public landfills in the country, managing approximately one million tons annually. The facilities operated by SWACO are an asset to the residents, businesses and political subdivisions. In addition to SWACO's facilities, there are several private sector entities that also help to collect, transport and recycle solid waste within the District. Other districts without these assets must pay for the transport of waste to landfills located in distant counties.

All solid waste management districts (SWMDs) in Ohio are required to update their solid waste plan every three or five years, depending upon the length of the planning period. SWACO has recently submitted their draft solid waste management plan update to Ohio EPA for the initial review. The Plan Update will be sent to all political subdivisions for review and approval after public hearings in 2017.

Local Level

Cities and, in some cases, townships were the foundations of the waste management process in the 1900s. In Ohio, there were hundreds of small landfills operating to service political subdivisions who collected waste from their residents. There are still several cities that operate their own solid waste collection systems. The City of Columbus is one example in SWACO. However, the current trend has been to privatize this service, and so fewer cities now operate their own collection system.

With that changing trend towards privatization and the creation of solid waste districts, the local level has not been as involved in managing solid waste. In most cities, the contracting piece is managed by the City through the hiring of a waste hauler. The waste hauler provides the residential services which can include trash, recycling and yard waste collection.

The first twenty-five to thirty years of solid waste planning in Ohio has focused primarily on the State and County levels of government, including setting up residential recycling and meeting the goals established in the *2009 State Plan*. The next twenty-five years will likely focus on the local level and how political subdivisions and individual entities such as schools, universities, hospitals, sports venues, industry and businesses can make a big difference. This ZWP will outline alternatives and options for the City of Bexley to move toward zero waste.

How Did This ZWP Get Started?

The City of Bexley's Mayor and Service Director were approached a few years back regarding the development of a ZWP. Timing and funding were an issue at the time. In 2015, another meeting was scheduled to discuss the possibility of completing a ZWP with the City. Discussions were also held with SWACO to determine if grant funding would be available. At the time, SWACO was revising its grant program. GT Environmental, Inc. (GT) presented the ZWP opportunity to Bexley City Council. The Council agreed to move forward with a grant application to SWACO for the 2016-2017 funding year. The grant application was prepared and submitted in July 2016 and was approved by SWACO in August 2016. The City of Bexley has one year to prepare the ZWP.

SWACO
FROM WASTE TO RESOURCES

What is Zero Waste?

The term "zero waste" was first used publicly in the United States in the 1970s, and gained more widespread use since the late 1990s as communities such as San Jose, California; Austin, Texas; and Boulder, Colorado developed comprehensive plans to implement strategies associated with this concept. There are many different interpretations of zero waste, and it is useful to examine the various definitions established by entities engaged in promoting this objective.

Zero Waste means "designing and managing products and processes to systematically avoid and eliminate the volume and toxicity of waste and materials, conserve and recover all resources, and not burn or bury them." (Seattle Public Utilities)

Zero Waste "maximizes recycling, minimizes waste, reduces consumption and ensures that products are made to be reused, repaired or recycled back into nature or the marketplace." (Grassroots Marketing Network)

Zero Waste "is a goal that is ethical, economical, efficient and visionary, to guide people in changing their lifestyles and practices to emulate sustainable natural cycles, where all discarded materials are designed to become resources for others to use. Zero Waste means designing and managing products and processes to systematically avoid and eliminate the volume and toxicity of waste and materials, conserve and recover all resources, and not burn or bury them. Implementing Zero Waste will eliminate all discharges to land, water or air that are a threat to planetary, human, animal or plant health." (Zero Waste International Alliance)

"When waste is defined differently – as everything that isn't needed to deliver value to customers – achieving **zero waste** requires a lot more creative work. Eliminating waste is a

continuous process of removing material resources (including fuels) from every part of your business, even – and perhaps most importantly now – from your product. It's about drastically improving resource performance by using strategies like dematerialization and lightweighting, while delivering more benefits to your customers. It involves a willingness to reorient your thinking". (dMass)

"The pathway to zero waste requires a shift in thinking. Previously, we treated waste as waste. We must think of waste as material that can be used and capitalized upon. We must move toward a comprehensive and integrated approach that manages materials throughout their lifecycles and encourages stakeholders to take their share of responsibility, through smartly designed incentives. That shift in thinking means we will focus on:

- Reducing the production of waste;
- Promoting more efficient use of materials;
- Increasing the recycling of materials that have served their useful purpose;
- Reducing the amount of waste requiring disposal;
- Reducing the toxicity of the waste requiring disposal; and
- Improving the environmental performance of solid waste management facilities". (Massachusetts 2010 – 2020 Master Waste Plan; Pathway to Zero Waste)

All of the above definitions attempt to capture the meaning of zero waste. Even though there are many more definitions, it is obvious that each one has a similar objective, goal, theme, and quite possibly even a new way of thinking. The overarching theme for zero waste is an effort to improve the earth's environment by eliminating waste, using fewer resources to create products, and eliminating discharges to the environment. There are many permutations on this theme and they all cannot be captured here. For the City of Bexley and the purposes of this ZWP, zero waste is defined as follows:

> ***"Zero Waste is the City's goal to significantly reduce its contribution to the landfill. This reduction will occur through reuse, recycling, and sustainable environmental initiatives that focus on our residents and businesses through public engagement, education and infrastructure."***

The City of Bexley will accomplish the Zero Waste objective by 2040 or sooner when it achieves a 90% reduction of materials disposed at the landfill. The recommendations will be implemented in Phases and the ZWP will be updated by the City of Bexley Green Team every five years or earlier as determined by City Council.

This ZWP is made up of several sections covering topics that will help move the ZWP and roadmap for Bexley from concept to implementation. The sections are described as follows:

- Section 2 includes the development of a strategy to achieve the goals established by the Bexley Green Team**.**
- Section 3: Residential Waste Sector includes an analysis of residential waste generation, recycling and reduction and recommendations for improvements.
- Section 4: Commercial Waste Sector includes an analysis of the City of Bexley business community. A survey of businesses will provide data and analysis to assist with the development of recycling and waste reduction improvements.
- Section 5: Institutional Waste Sector will look at Capital University, Bexley City Schools and Columbus School for Girls – The ZWP will review existing programs and plans at these institutions. Recycling and materials management at ongoing special events sponsored by the City of Bexley and other institutions will also be evaluated. Opportunities for improvements will be presented in Section 5.
- Section 6: Education and Promotion of the ZWP: This Section will identify opportunities to promote, educate and engage the public on the ZWP program recommendations. This will involve social media, web site information dissemination and opportunities for public outreach in the classroom and community.
- Section 7: Moving toward Zero Waste – will present and evaluate the short-term vs. long-term goals the Green Team recommends for the City regarding zero waste. The ZWP will include an economic assessment of recommendations and their impact on the City, residents and businesses. If information is not available on costs, the ZWP will recommend options for obtaining that information as a recommendation.

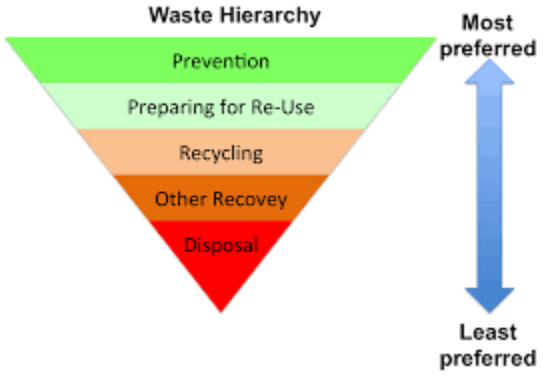
  As mentioned throughout the ZWP, the success of any program or strategy is at least somewhat dependent on the collection of data. The data is then used to measure progress of implementation, and can be very helpful for making necessary changes to programs and policies. A survey of local businesses was conducted as part of the ZWP development to ascertain interest in food waste recovery. (See Section 4 for further discussion of the survey results.) Section 3 also discusses the collection of data as well as other recommendations which will allow the ZWP to remain a viable document for years to come.

SECTION 2 – STRATEGIC PLANNING

The City of Bexley Green Team developed the strategic initiatives included in this Section. The Green Team worked to develop the ZWP mission statement, goals and definition of zero waste. The Strategic Plan will guide the Green Team as it moves forward with implementation of the ZWP in future years.

Waste Hierarchy

Managing waste and embarking on a path to zero waste requires a roadmap. The United States Environmental Protection Agency (USEPA) has ranked the most environmentally sound strategies for managing municipal solid waste. Preventing the generation of waste is the most preferred method, followed by reuse, recycling and composting, energy recovery, and, lastly, treatment and disposal. The ZWP will follow this path and work toward recommendations that rank as the most preferred in the waste management hierarchy.



Strategic Plan

The first step in developing this ZWP was to work with the Green Team to identify their goals and objectives for the ZWP and establish the City's Mission. The Green Team has drafted a mission statement for materials management for the City of Bexley.

City of Bexley Mission Statement

The Bexley community will significantly reduce its contribution to the landfill through sustainable environmental initiatives for residents, businesses, institutions, and industries by improving public engagement, education, and infrastructure.

City of Bexley 2017 Zero Waste Plan Strategic Goals

Goal 1-2017 – Develop Data Collection Strategy

- Objective 1-1-2017 – Establish baseline statistics using known data sources including:
  - City/hauler records
  - Survey responses (using an electronic survey platform such as SurveyMonkey)
  - SWACO
  - Ohio EPA data
  - Ohio Development Services Agency
  - National statistics
  - Other
- Objective 1-2-2017 – Require disposal and diversion statistics from service providers (add contractual language when appropriate).
- Objective 1-3-2017 – Identify measurable outcomes for programs, projects, and activities that cannot be measured volumetrically or by weight (i.e., number of presentations given, total advertisements placed, etc.).
- Objective 1-4-2017 – Periodically evaluate data collection strategy and make improvements as necessary.

Goal 2-2017 – Improve Residential Sector (single family, multi-family) Waste Management

- Objective 2-1-2017 – Evaluate existing residential collection services.
- Objective 2-2-2017 – Use waste hierarchy to evaluate residential sector service improvements (i.e., organics, HHW, electronics).
- Objective 2-3-2017 – Evaluate eliminating plastic bags and other unnecessary packaging such as polystyrene.
- Objective 2-4-2017 – Evaluate opportunities to improve materials management for residents in multi-family housing units.
- Objective 2-5-2017 – Evaluate opportunities to implement an ordinance requiring recycling for multi-family housing units with 4 or more units.
- Objective 2-6-2017 – Evaluate opportunities to improve ease of residential recycling (i.e., provide backdoor collection if trash is also collected at the backdoor).

Goal 3-2017 – Improve Commercial Sector (restaurants, theatres, shops, medical businesses, etc.) Waste Management

- Objective 3-1-2017 – Evaluate existing commercial collection services.
- Objective 3-2-2017 – Use waste hierarchy to evaluate commercial sector service improvements (food waste, cardboard, glass, paper, plastic, metals).

- Objective 3-3-2017 – Evaluate eliminating plastic bags and other unnecessary packaging.
- Objective 3-4-2017 – Evaluate opportunities to improve materials management for commercial facilities in strip malls.

Goal 4-2017 – Improve Institutional Sector (hospitals, schools, university, government) and Special Events Waste Management

- Objective 4-1-2017 – Evaluate existing institutional collection services.
- Objective 4-2-2017 – Use waste hierarchy to evaluate institutional sector service improvements.
- Objective 4-3-2017 – Evaluate contract opportunities to improve materials management for institutional facilities.
- Objective 4-4-2017 – Evaluate recycling and waste management for special events in Bexley held by the City and other institutions.

Goal 5-2017 – Improve Industrial Sector (product manufacturer) Waste Management – This goal has been combined in Section 4

- Objective 5-1-2017 – Evaluate existing industrial collection services.
- Objective 5-2-2017 – Use waste hierarchy to evaluate industrial sector service improvements.

Goal 6-2017 – Establish Education and Outreach Program

- Objective 6-1-2017 – Develop an education and outreach plan for each target audience (residents, commercial businesses, institutions, etc.).
- Objective 6-2-2017 – Develop Bexley Zero Waste content for Facebook and/or City website page.
- Objective 6-3-2017 – Prepare topical videos and posts which focus on sustainable practices, or borrow content from public/private resources (i.e., SWACO, Rumpke). Topics for videos and posts could include backyard composting, recycling, providing re-useable materials to Habitat Restore, etc. Distribution of the videos and posts would take place through social media.
- Objective 6-4-2017 – Develop and promote a web-based directory of local reuse and recycling options for all types of materials.

Goal 7-2017 – Identify Needed Infrastructure (processing or waste management facilities)

- Objective 7-1-2017 – Create a list of needs for processing or waste facilities for the City of Bexley.

- Objective 7-2-2017 – Present the list of needs to SWACO and service providers.
- Objective 7-3-2017 – Identify other political subdivisions to engage in a discussion about shared processing or waste management facilities.

Goal 8-2017 – Zero Waste Plan Implementation

- Objective 8-1-2017 – Determine future role of Green Team
- Objective 8-2-2017 – Identify City of Bexley departments that will be responsible for implementing plan recommendations while being mindful of available resources (i.e. human, financial, departmental capacity)
- Objective 8-3-2017 – Work with other Bexley organizations to implement plan recommendations (Lions Club, Kiwanis, Rotary, etc.)
- Objective 8-4-2017 – Assist other organizations with establishing individual Green Teams

Goal 9-2017 – Develop a Waste Diversion Plan

- The Zero Waste Plan will include Goals 1-8. The Zero Waste Plan shall be consistent with the SWACO Solid Waste Management Plan. The Plan shall identify methods to encourage City businesses and institutions to adopt and achieve their own zero waste initiatives. The Plan shall also provide recommendations and priorities on procurement policies, recycling programs, organics, household hazardous waste, special materials (e.g., electronics), and construction and demolition debris management for the City as well as entities doing business in the City.

Goal 10-2017 – Submit Zero Waste Plan to City Council

- Objective 10-1-2017 – A public hearing will be held to present the draft Zero Waste Plan and obtain comments from residents. The draft plan will be available for review electronically prior to the public hearing.
- Objective 10-2-2017 – The Green Team shall submit a draft Zero Waste Plan for review by Bexley City Council (September 2017)

Defining Zero Waste

Zero Waste is a relatively new term in managing waste. Definitions of zero waste are variable and include a communities or businesses specific goals for eliminating waste. Typically, the definition will include a percentage goal as a target to achieve. The target may also have a time reference to attain the percentage goal(s).

The definition may also include the types of waste reduction or methodologies that may be used to achieve zero waste or can be excluded from zero waste. For example, incineration

which reduces the volume of waste generated has been excluded from some community zero waste definitions.

The focus of past waste planning activities included recycling programs to extract materials from the waste stream and return those materials to commerce. In Ohio, this has been a main thrust of solid waste management plans. This includes having the recycling infrastructure in place to manage the extracted materials. The plans evolved to include other special types of recyclable materials including household hazardous waste, tires, yard waste, electronics and other specialty items.

A zero waste plan has a broader context in that it looks at waste as a complex system. Waste occurs for many reasons and there are many ways to manage it including:

- Reduce consumption
- Minimize generation
- Recycle Materials
- Reuse Materials
- Repair equipment

Instead of thinking of materials as a waste, under a zero waste system, materials are evaluated as a resource. Can waste materials become a raw material in a manufacturing process? What about energy production? The ZWP is a roadmap showing how the community will get from its current status to the stated goals outlined in this plan.

City of Bexley Definition of Zero Waste

Zero Waste is the City's goal to significantly reduce its contribution to the landfill. This reduction will occur through reuse, recycling, and sustainable environmental initiatives that focus on our residents and businesses through public engagement, education and infrastructure.

The City of Bexley will accomplish the Zero Waste objective by 2040 or sooner when it achieves a 90% reduction of materials disposed at the landfill. The recommendations will be implemented in Phases and the ZWP will be updated by the City of Bexley Green Team every five years or earlier as determined by City Council.

Recommendation by the City of Bexley Green Team

In order to implement this ZWP, the Bexley Green Team is recommending that City Council create and adopt the Environmental Sustainability Advisory Council.

Purpose

The Environmental Sustainability Advisory Council (ESAC) shall be charged with meeting the Mission and Goals established in this ZWP and recommending to City Council implementation of programs and strategies as prioritized. The ESAC may also provide advice to Council on other green policies, environmental, sustainability and energy issues.

Membership

The ESAC shall be comprised of not less than seven nor more than eleven members. Members shall not be paid. Appointments to the ESAC shall be made by City Council. Members, shall be Bexley residents and qualified by experience and/or training in matters related to the environment and sustainability such as: education, energy, civil construction/engineering, green building, landscape design, environmental engineering, consulting, law, recycling/solid waste, air and water quality, and environmental health.

Membership shall include one city council member, one institutional representative from either the Bexley City School District, Capital University, Columbus School for Girls, St. Charles or other institution and the Mayor, or the Mayor's designee. The city council member, the institutional representative, and the Mayor, or the Mayor's designee, shall be voting members.

Members shall serve two or three year staggered terms. Five of the members each shall serve an initial term of three years; six of the members each shall serve an initial term of two years. Thereafter, all terms shall be for two years. The Mayor, the institutional representative and City Council representative shall serve for the initial three-year term. The Mayor shall determine the additional two positions serving three year terms.

Function, Duties, and Responsibilities

The ESAC shall be advisory in nature. The duties and responsibilities of the ESAC shall include, but not be limited to:

(A) Advising City Council, the Mayor, and city officials on:
- (i) The implementation and revisions of the ZWP;
- (ii) The review of existing city green policies;
- (iii) Trends affecting the environment and the community;
- (iv) Recommendations on methods of funding the ZWP, programs and strategies.

(B) Recommending city and community priorities and resources relative to the ZWP and other sustainability issues;

(C) Coordinating and assisting other City of Bexley boards and commissions to determine if new plans/proposals are in compliance with ZWP sustainability goals;

(D) Partnering with outside boards and commissions, such as MORPC and the Franklin Soil & Water Conservation District, to further the city's sustainability goals;

(E) Providing a forum for addressing public concerns relative to sustainable practices;

(F) Developing educational outreach activities and materials; and

(G) Drafting indicators to measure the successes of the ESAC.

City Support Staff

The implementation of the ZWP will require support from the City and the ESAC. There are numerous options available to the City to obtain champions for different aspects of the ZWP. This could include but are not limited to:

- Dedicated citizens
- School class projects at the high school or higher education.
- Student interns from Capital or other higher education institutions.
- Other City resources as identified by the Administration and Council.

Meetings

The ESAC shall meet monthly at City Hall or as determined by the ESAC. The ESAC shall develop by-laws and select a Chair, Vice Chair to run the meetings and a secretary to record the minutes. Meetings will be listed on the Bexley Calendar of Events.

Subcommittees

The ESAC shall appoint subcommittees as necessary. Subcommittees will have responsibility for implementing specific ZWP program recommendations such as improving curbside recycling (i.e., provision of carts for all households, implementing a pay-as-you-throw program, etc.), reviewing and upgrading as necessary recycling containers in all City buildings and offices, etc. The chairperson of each subcommittee will be a member of the ESAC. Membership of the subcommittees will consist of 5 to 8 persons, and the subcommittees will report to the ESAC.

SECTION 3 – IMPROVE RESIDENTIAL SECTOR (SINGLE FAMILY, MULTI-FAMILY) WASTE MANAGEMENT

- Objective 2-1-2017 – Evaluate existing residential collection services.
- Objective 2-2-2017 – Use waste hierarchy to evaluate residential sector service improvements (i.e., organics, HHW, electronics).
- Objective 2-3-2017 – Evaluate eliminating plastic bags and other unnecessary packaging such as polystyrene.
- Objective 2-4-2017 – Evaluate opportunities to improve materials management for residents in multi-family housing units.
- Objective 2-5-2017 – Evaluate opportunities to implement an ordinance requiring recycling for multi-family housing units with 4 or more units.
- Objective 2-6-2017 – Evaluate opportunities to improve ease of residential. recycling (i.e., provide backdoor collection if trash is also collected at the backdoor).

A. Existing Residential Collection Services

1. Single-Family Households

How collection is provided. Single-family dwellings in Bexley's residential sector currently have curbside collection for trash, yard waste, and recyclables. The City's contract with Rumpke Waste currently includes billing for 4,246 households, however, the trash and recyclables are collected using various approaches. Table 3-1 below shows that trash is collected from 676 households using rolling carts, while carts are used at 816 households for recyclables collection.

Table 3-1. Existing Collection Service Variations

How collection is provided…			
Trash		**Recyclables**	
Category	**# of Households**	**Category**	**# of Households**
Containers			
96-gallon carts	419	96-gallon carts	181
64-gallon carts	194	64-gallon carts	425
48-gallon carts	63	48-gallon carts	210
Totals	676		816
Collection Location			
Curbside	0	Curbside	4,246
From an alley	1,789	From an alley	0
Driveway/garage	2,457	Driveway/garage	0

The City provides the following instructions for the placement of carts and other containers:

> "Residents with alleys should place their trash at their alley frontage in lidded trash cans, and place their recycling and yard waste at their front yard between the sidewalk and the curb. Residents without alleys should place their trash at the top of their driveway, with recycling and yard waste placed between the sidewalk and the curb."

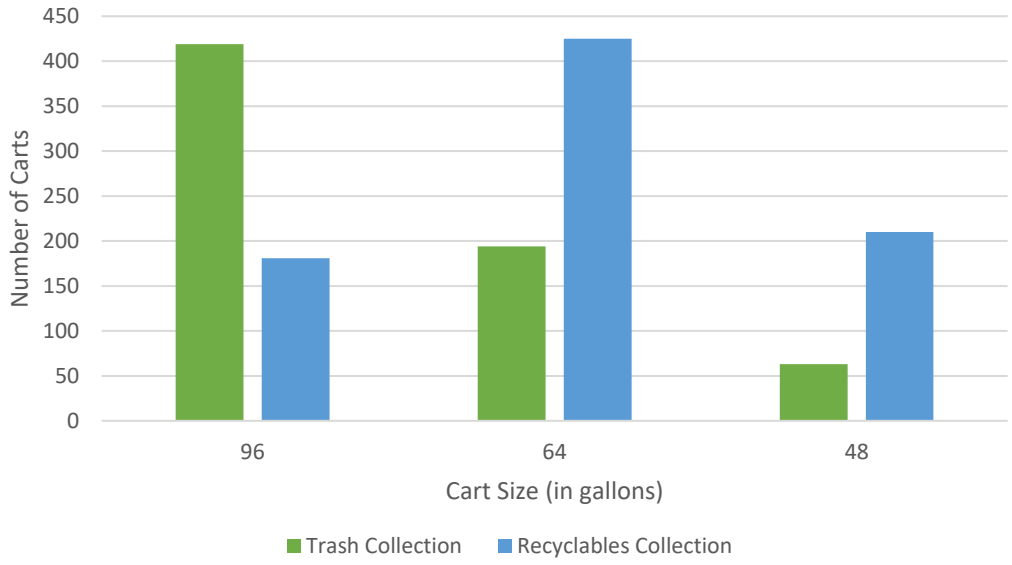
Collection vehicles. Rumpke collects trash from residents using 10 rear loading trucks, while 3 rear loading or side loading trucks are used for collecting recyclables. Yard waste is collected with 3 rear rear-load vehicles. An example of a rear-loading collection vehicle is shown below in Figure 1.

Figure 3-1. Rear-loading Collection Vehicle

In February 2015, Bexley City Council passed an ordinance which allowed City residents to purchase carts from the City at subsidized rates. Ninety-six-gallon carts were made available to residents at $30, while 64-gallon carts were available for $20. The City sells other cart sizes at a 50 percent discount.

The size of the carts used by residents varies, with 96-gallon carts being the most frequently used for trash and 64-gallon carts most often used for recyclables. (See Figure 3-2.)

Figure 3-2. Size of Carts Used for Trash and Recyclables Collection



Types of materials recycled. The recycling program in Bexley allows residents to divert a wide range of materials from the trash. Figure 3-3 below shows a portion of a Rumpke Waste flyer listing the materials which are acceptable for the recycling program. The same flyer also lists materials which are acceptable such as plastic bags, plastic containers which are not bottles or jugs, window glass, etc.

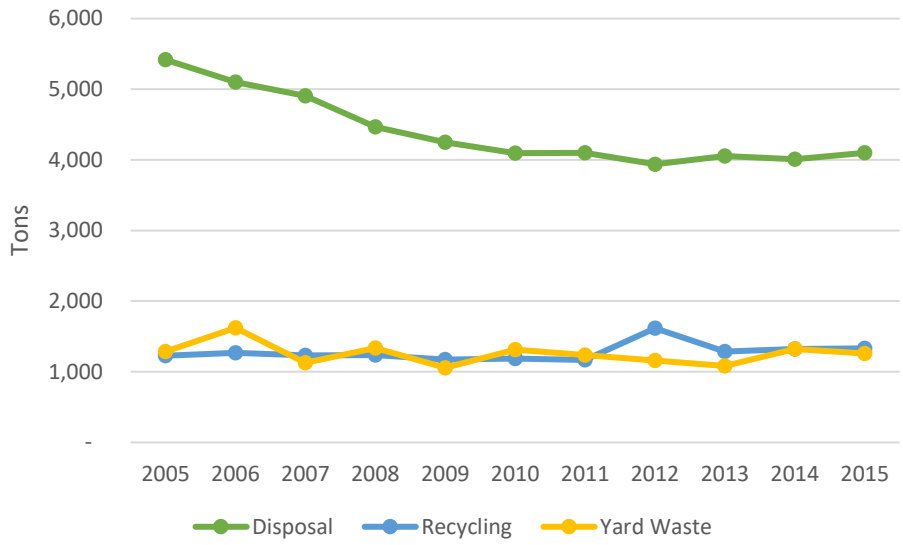
Figure 3-3. Bexley Recycling Program: Acceptable Materials

Frequency of collection. Trash, yard waste, and recyclables are picked up on Monday mornings of each week.

Quantity of materials collected. Data for the eleven-year period from 2005 through 2015 shows that the tons of recyclables and yard waste collected from Bexley residents

have remained relatively constant. In contrast, the tons of trash collected have decreased by more than 1,300 tons. The decline in trash disposal has flattened since 2010, and the tons disposed has actually increased by four percent since 2012.[1]

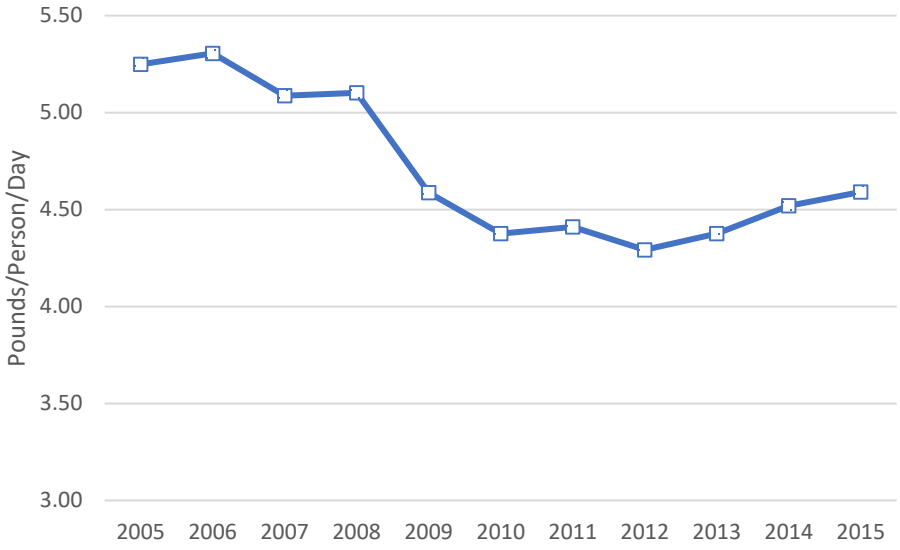
Figure 3-4. Tons of Trash, Recyclables Yard Waste Collected: 2005 – 2015



Bexley's experience regarding the disposal rate is not unlike the experience for the State of Ohio. Figure 3-5 shows that the statewide disposal rate in pounds/person/day decreased substantially until 2010, then continued to decline through 2012. Since 2012, the statewide rate has been increasing each year.

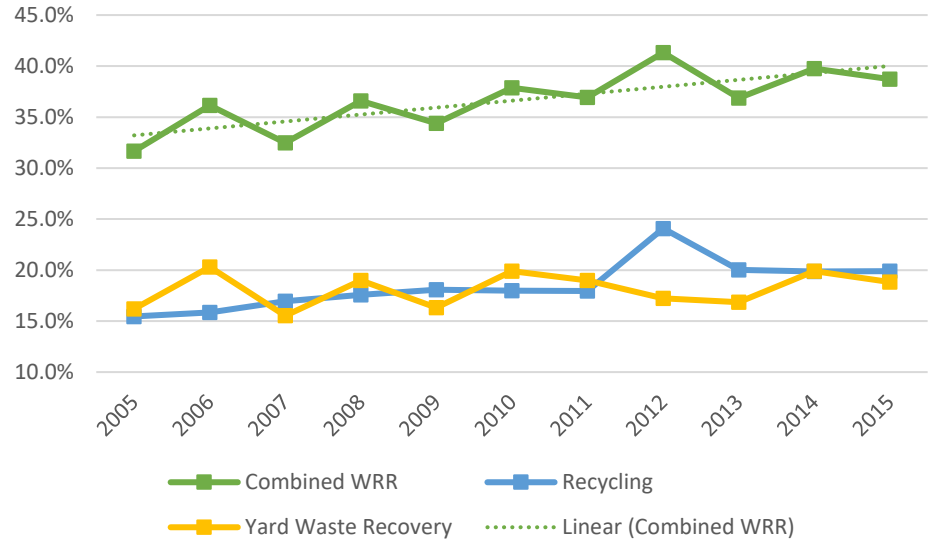
[1] These tonnages do not include the amounts from multi-family residential housing units. Actual data for recycling, yard waste collection, and disposal is not available for multi-family housing at this time.

Figure 3-5. Statewide Disposal Rate: 2005 – 2015



Bexley's Residential Recycling and Waste Reduction Rates. In order to determine the percentage of Bexley's single-family waste which is recycled or reduced, the amount recycled or reduced is divided by the total generation. Total generation is represented by the sum of disposal plus recycling and yard waste collection. Figure 3-6 shows that the yard waste recovery and the recycling rates have been similar throughout the eleven-year period. The combination of recycling and yard waste recovery has resulted in an overall waste reduction rate of nearly 39 percent in 2015.

Figure 3-6. Recycling and Waste Reduction Rates: 2005 – 2015



2. Multi-Family Housing Units

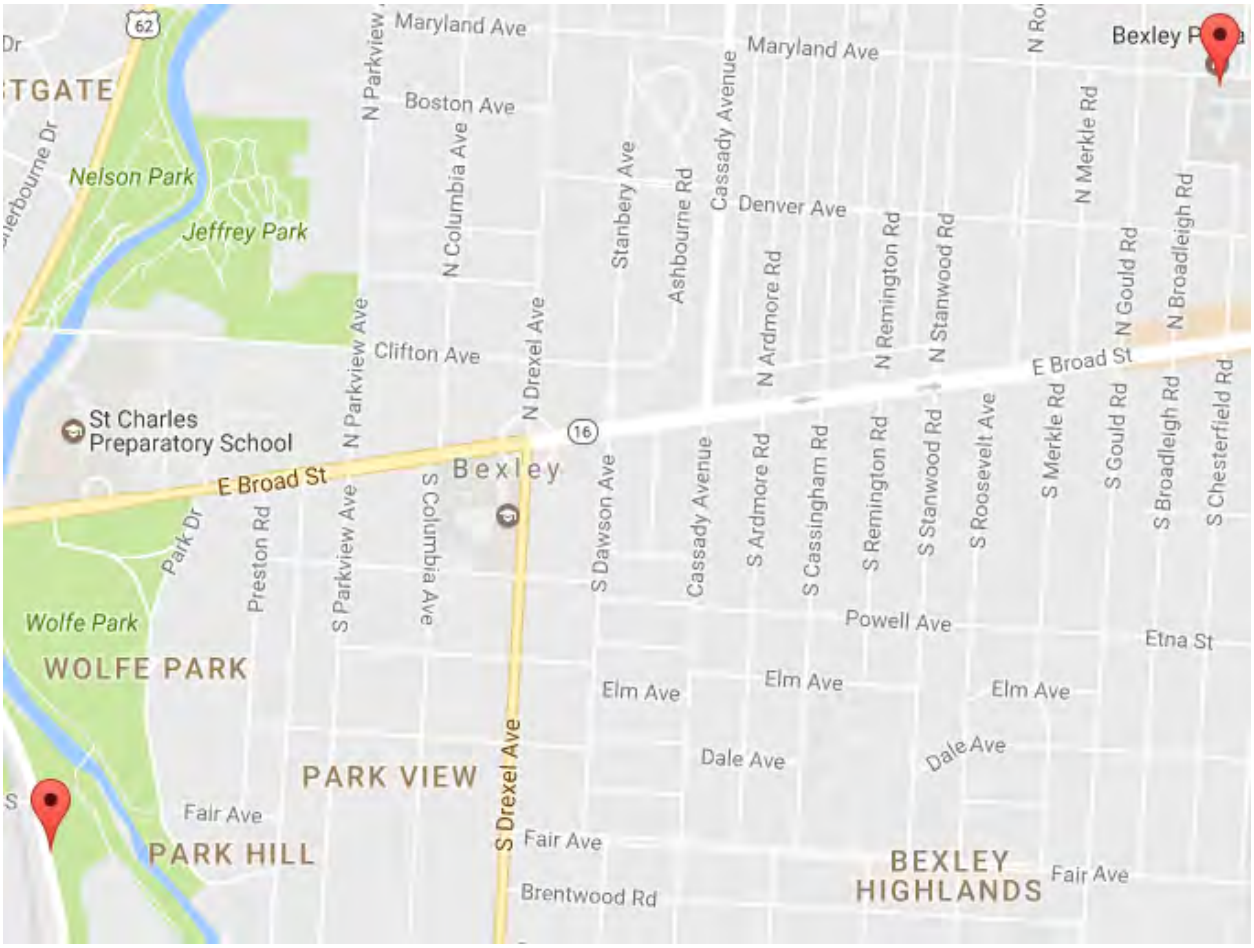
Using data from the 2010 Census and making projections based upon the increase in Bexley's total population for 2015, the City of Bexley includes roughly 1,100 multi-family housing (MFH) units, with approximately 3,000 people living in those units. Actual disposal and recycling data is not currently available for multi-family housing in Bexley. However, it is possible to estimate the total solid waste generation for this sector by applying the generation rate calculated from single-family dwellings, or 3.44 pounds/person/day.[2] Using this generation rate results in a total generation estimate of approximately 1,900 tons from MFH.

Trash collection is provided at MFH units by private haulers, and data showing the amount of trash collected is not available. Similarly, recycling data from MFH units is not available, and furthermore, it is not clear how many residents of MFH have reasonably close access to recycling opportunities. The Solid Waste Authority of Central Ohio (SWACO) does not currently have any recycling drop-offs located within the City of Bexley. However, there are two drop-offs just outside City boundaries:

- Cleo Dumaree Athletic Complex on Nelson Road; and
- Broadleigh Elementary School on Maryland Avenue

[2] 3.44 pounds/person/day may over-estimate the generation rate for multi-family housing since yard waste may not be generated from these housing units at the same rate as single-family housing.

Figure 3-7. SWACO Drop-off Recycling Locations Near Bexley



B. Possible Improvements to Residential Recycling and Waste Diversion

A number of approaches could result in greater recycling and waste diversion for the City of Bexley. These approaches include:

- Expanding the use of carts for single-family curbside collection.
- The use of a pay-as-you-throw (PAYT) program for trash and recyclables collection.
- Encouraging residents to compost yard waste in their back yards.
- Develop a program for the recovery of food waste.
- Emphasize and develop collection opportunities for household hazardous wastes (HHW), electronics, textiles, and other materials.
- Develop a program to reduce packaging and possibly eliminate the use of plastic bags.
- Expand any existing recycling opportunities for residents living in MFH units.

- Evaluation of backyard collection service.
- Evaluate opportunities to implement an ordinance requiring recycling for multi-family housing units with 4 or more units.

Each of the approaches listed above is discussed below in the remainder of Section 3.

1. Expanding the Use of Carts

Experience in other cities and other political jurisdictions throughout the United States has shown that the use of carts can dramatically increase the quantity of recyclables collected. According to a study developed for the State of Michigan, curbside programs in the State recovered between 300 and 840 pounds per participating household, with the median weight of 571 lbs./participating household.[3] A guide for implementing cart-based collection systems developed by The Recycling Partnership, estimates that programs using carts which "…collect a common suite of materials, [have] strong outreach, and other BMPs [best management practices] can recover 400 to 450 pounds/household/year."[4]

Based upon the data for 2015, Bexley's curbside program collected 626 lbs./household for 4,246 households. This calculation suggests that the curbside program is already performing quite well with respect to programs in other cities, even though the percentage of households currently using carts is only about 20 percent. It is entirely possible that additional recovery of recyclables could be achieved in Bexley based upon another study by The Recycling Partnership which states that, "…waste characterization and recovery rate studies have shown U.S. households annually generate between 800 and 1,000 pounds of recyclables that could be placed in a recycling container."[5] Some of the advantages of a cart-based collection system include:

- The use of carts makes recycling easier. Although some residents are always resistant switching to carts initially, most people become converts after using carts. Rolling a cart to the pickup location is much easier than carrying one or more containers from the house to be collected.
- Carts minimize problems of blowing paper.
- Carts provide more space for recyclables, including bulky items.

[3] "Measuring Recycling in the State of Michigan: Final Report," A Project of the Michigan Recycling Coalition with Grant Funding from the Department of Environmental Quality, May 2015.
[4] "A Guide to Implementing a Cart-Based Recycling Program," The Recycling Partnership, 2015.
[5] "The 2016 State of Curbside Report", The Recycling Partnership, 2016.

Another potential benefit of the widespread use of carts is Radio Frequency Identification tags, or RFID tags. A cart program provides the opportunity to affix each cart with a RFID tag which can transmit data through electromagnetic induction, or radio waves at the point of collection. This technology allows capturing a multitude of data which can be used to improve the collection program, such as determining participation rates and setout rates, identifying low-performing areas (potentially good targets for education), and verifying the provision of service. The use of RFID tags and associated technology required to implement this option will increase the cost of the collection program. The Recycling Partnership estimates that the initial investment for an RFID program could range from $25,000 to $50,000, with monthly costs at $300 to $650 for the City. (The Recycling Partnership provides several tools as well as assistance to communities to improve curbside recycling. See http://recyclingpartnership.org/ for details.)

2. Pay-As-You-Throw (PAYT) Program and Other Incentive Programs

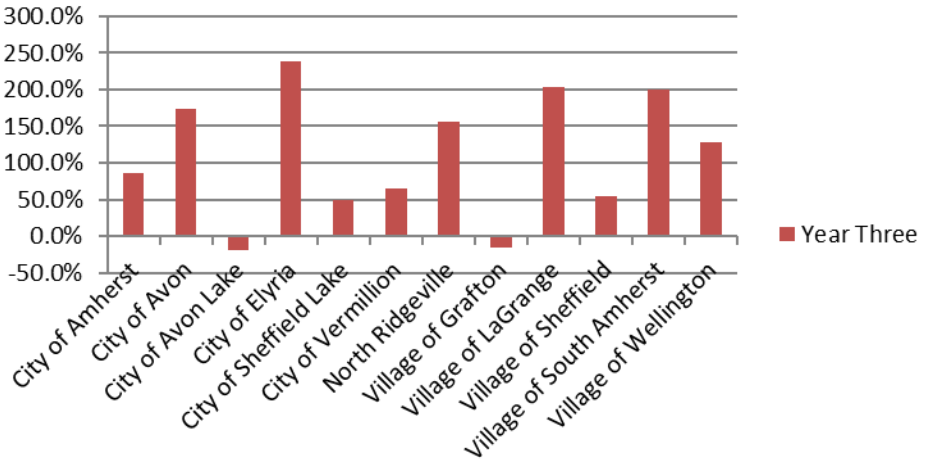
Pay-As-You-Throw (PAYT) collection programs, which are also referred to as volume-based systems (VBS), are designed to create an economic incentive for residents to reduce trash generation and recycle more materials. Residents are typically charged for their trash and collection of recyclables is free. A PAYT or VBS program can be structured for various types of collection systems:

- A bag program: residents are charged a base rate for a "maximum" number of bags of trash, plus an amount for each additional bag greater than the maximum number allowed. Residents are not charged for bags of recyclables.
- A cart program: residents have the opportunity to choose from two or more sizes for their trash cart, with larger sizes costing more each month. The use of recycling carts is free.

Other configurations and variations for PAYT programs are possible as well.

Evidence has shown that these programs can be quite successful for increasing the quantity of recyclables from curbside programs. After three years from the implementation date, VBS collection programs in Lorain County, Ohio increased the recovery of recyclables an average of 108 percent. (See Figure 3-8 below.) There has been a wide variation in the recovery rate change among Lorain County jurisdictions, ranging from -20 percent to +239 percent.

Figure 3-8. Volume-Based Collection Systems: Lorain County, Ohio



VBS experience in other cities across the United States has been quite successful in many case as well. Although the information is somewhat dated, the changes identified in the programs included in Table 3-2 continues to be useful.

Table 3-2. Implementation of Volume-Based Collection Systems: Selected Cities

City	Changes in Recycling, Disposal, Costs, etc.
Portland, Ore.	Increased recycling rate from 7 percent to 35 percent one year after implementing PAYT in 1992.
Austin, Texas	Increased recycling rate from 9.8 percent to 28.5 percent between 1991 and 2000.
Worcester, Mass.	Reduced waste by 40 million pounds from 1992 to 1999.
Dover, N.H.	Reduced waste by 7,100 tons each year from 1991 to 1999, achieved a 50 percent recycling rate, and saved $322,000 annually.
Falmouth, Maine	After beginning a PAYT program in 1992, the city immediately increased its recycling rate by more than 50 percent to 21 percent; trash disposal volumes decreased by about 35 percent; and it saved $88,000.
Fort Collins, Colo.	In 1996, the city increased its recycling rate to 79 percent participation in single-family and duplex households — up from 53.5 percent in 1995.
Gainesville, Fla.	In 1994, the first year of the city's program, solid waste collected decreased by 18 percent from 1993, recyclables collected increased by 25 percent, and the city saved $186,000.

Table 3-2. Implementation of Volume-Based Collection Systems: Selected Cities

City	Changes in Recycling, Disposal, Costs, etc.
Mount Vernon, Iowa	Solid waste collected decreased by 40 percent from 1990 to 1995.

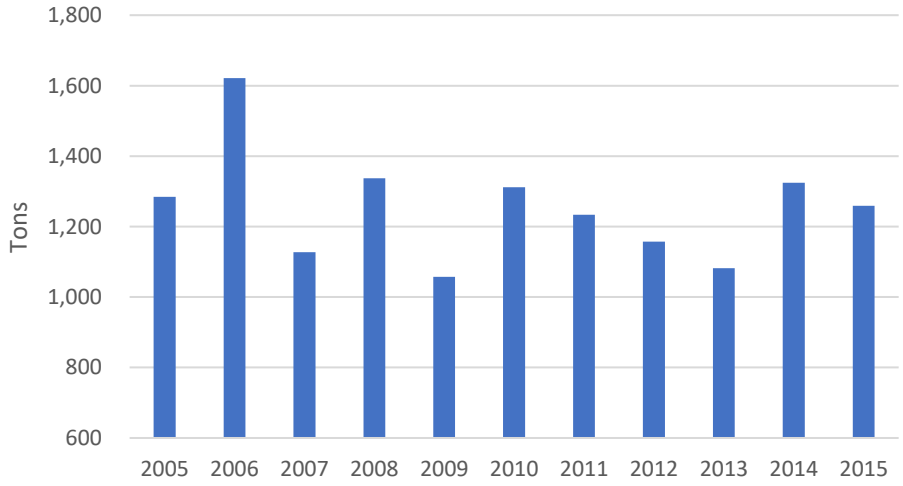
Source: Janice Canterbury and Ryan Newill, "The pay-as-you-throw payoff," *American City and County*, October 1, 2003.

Problems or challenges can also occur with VBS. More open dumping of trash and contamination of recyclables is possible with the implementation of a volume-based collection system, as some residents look for ways to reduce the cost of their trash disposal. However, this problem is usually more prevalent in rural areas. Another issue faced by some communities that operate their own trash collection is decreasing revenues if the volume of trash declines with the implementation of a VBS collection program and revenues are based upon the tons of waste disposed.

3. Yard Waste Management

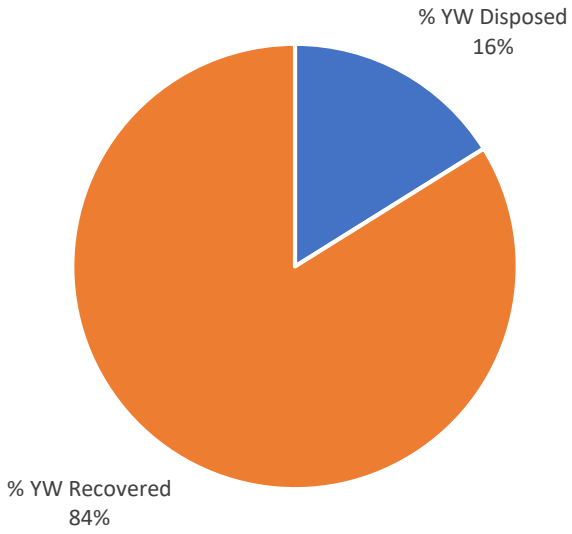
The current City of Bexley contract with Rumpke Waste requires yard waste collection from single-family dwellings. The tons collected have remained relatively constant throughout the past eleven years as shown in Figure 3-9 below. The average over the eleven-year period is 1,254 tons, while the average for the past six years is 1,228 tons.

Figure 3-9. Yard Waste Recovery in Bexley: 2005 – 2015



A waste sort conducted for SWACO in 2013 showed that 5.9 percent of the waste sent for disposal from Franklin County communities consisted of yard waste. Applying this percentage to the total tonnage of trash disposed from Bexley in 2015 results in an estimate of 242 tons of yard waste from single-family dwellings which was disposed, or not recovered for composting. Figure 3-10 illustrates that a high percentage of yard waste generated by single-family households in Bexley is currently captured for composting.

Figure 3-10. Percentage of Bexley Yard Waste Recovered vs. Disposed: 2015



Some yard waste is typically generated by businesses and institutions as well, but the data from these sources is not currently available. Using data from SWACO's Solid Waste Management Plan Update and making a number of assumptions, the total amount of additional yard waste available for recovery in Bexley is estimated to be 590 tons for both the residential and commercial/institutional sectors, or an overall recovery rate of 68 percent.

Promotion of backyard composting and recovery of yard waste at businesses and institutions are perhaps the best opportunities for increasing the tons of yard waste diverted from disposal. One of the challenges for a backyard composting strategy is quantification. If the material is no longer collected by a hauler or delivered to a centralized location, it becomes much harder to measure the contribution of a management strategy.

4. Food Waste Management

Food waste is typically one of the materials in the waste stream with the greatest potential for increased recovery and diversion from disposal. Residential collection of food waste is not currently provided in Bexley, and no data is available estimating the tons which are currently recovered. National data for waste composition shows that food waste comprises 14.6 percent of residential and commercial waste generation.

The SWACO waste sort cited above found 12.8 percent of the waste disposed from Franklin County communities was food waste. If this percentage is applied to the total residential and commercial waste generation, 1,280 tons of food waste are theoretically available for recovery in Bexley. However, only 41 percent of this amount is represented by the residential sector based on the information in SWACO's *Plan Update*.

The number of residential food waste curbside collection programs nationwide have increased substantially in recent years. According to *BioCycle Magazine*, the number of municipalities with a source-separated collection program for food waste increased from 24 in 2005 to 198 in 2013/2014.[6] The number of households with access to this service in 2013/2014 was estimated at 2.74 million across the U.S., while in Ohio, roughly 74,000 households were estimated to have food waste collection.

Many communities that have implemented food waste collection programs have added another cart, so that residents have one cart for trash, a second cart for recyclables (paper, cardboard, bottles, and cans), and a third cart for organics, or food scraps. Frequently, the third cart is used for both food scraps and yard waste.

Co-collection, which is characterized by having one vehicle collect trash, recyclables, and organics, has been used in some localities. This option is typically implemented using different colored bags for each type of waste, instead of using cans or carts. While co-collection results in less truck traffic on city streets, it requires more processing at a material recovery facility.

Collection of food waste in five-gallon plastic buckets with lids is another option available to communities. The City of Bexley is currently exploring implementation of a pilot project which will use this option.

[6] "BioCycle Nationwide Survey: Residential Food Waste Collection in The U.S.", *BioCycle Magazine*, Volume 56, No. 1, page 53, January 2015.

5. Household Hazardous Wastes (HHW), Electronics, Textiles, and Other Materials

HHW

Household hazardous wastes (HHW) comprises a small percentage of the waste generated from the residential sector. HHW is not a problem because of its quantity, but rather the potential that these leftover products may catch fire, react, or explode under certain circumstances, or are corrosive or toxic. Typical HHW usually includes paints, cleaners, oils, batteries, poisons and pesticides.

The strategies for managing HHW include:

- making choices to purchase less toxic or problematic products;
- completely using up household products; and
- bringing unwanted materials to a collection event or SWACO permanent collection center in Columbus.

Helpful suggestions for managing HHW and finding alternative, less toxic products can be found on U.S. EPA's website, and Ohio EPA's website, respectively:

https://www.epa.gov/hw/household-hazardous-waste-hhw#Reduce
http://epa.ohio.gov/portals/47/facts/HouseholdHazardousWaste.pdf

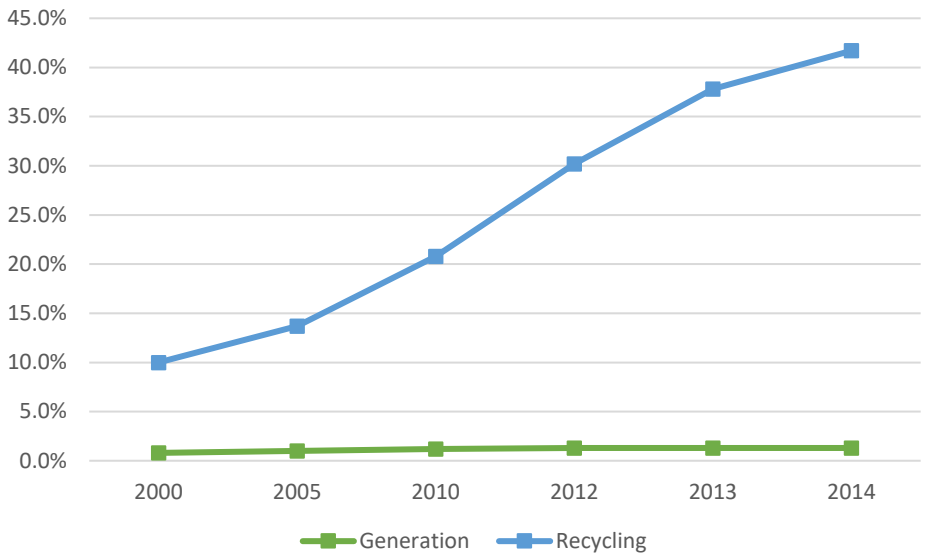
Estimates of HHW generation range from 3 to 10 gallons per household per year (or the equivalent of approximately 6 pounds of HHW per person per year).[7] For Bexley, this translates to approximately 32 tons of HHW generated by single-family dwellings each year, and 41 tons generated by all Bexley residents.

Electronics

Electronics is another relatively small portion of the residential waste stream, but improper management can create problems. While U.S. EPA estimates that generation of consumer electronics have increased slightly since the year 2000, the recycling of electronics have increased at a much greater rate. (See Figure 3-11.)

[7] "Household Hazardous Products and Hazardous Waste: A Summary for Consumers", Penn State University, College of Agricultural Sciences, Agricultural Research, and Cooperative Extension, 1998.

Figure 3-11. Generation and Recycling of Electronics in the U.S.



Source: "Advancing Sustainable Materials Management: Facts and Figures 2014", U.S. EPA, December 2016.

The estimate of total generation of electronics in Bexley is 174 tons for 2015 based upon research by the U.S EPA.[8] Using this estimate and the assumption that Bexley's percentage of total generation represented by the residential sector is the same as SWACO's, the tons of electronics generated from the residential sector only in Bexley is approximately 71 tons.

Recycling and re-conditioning of electronics represent a growing opportunity for communities. Organizations such as Goodwill have programs for repairing and upgrading donated computers, which are then sold at prices much lower than new models. SWACO created an E-Waste Diversion Program to collect and recycle old, unwanted e-waste in an environmentally-responsible manner. This program is open to communities in Franklin County such as the City of Bexley. (See Appendix F for more information regarding electronics collection and SWACO's diversion program.)

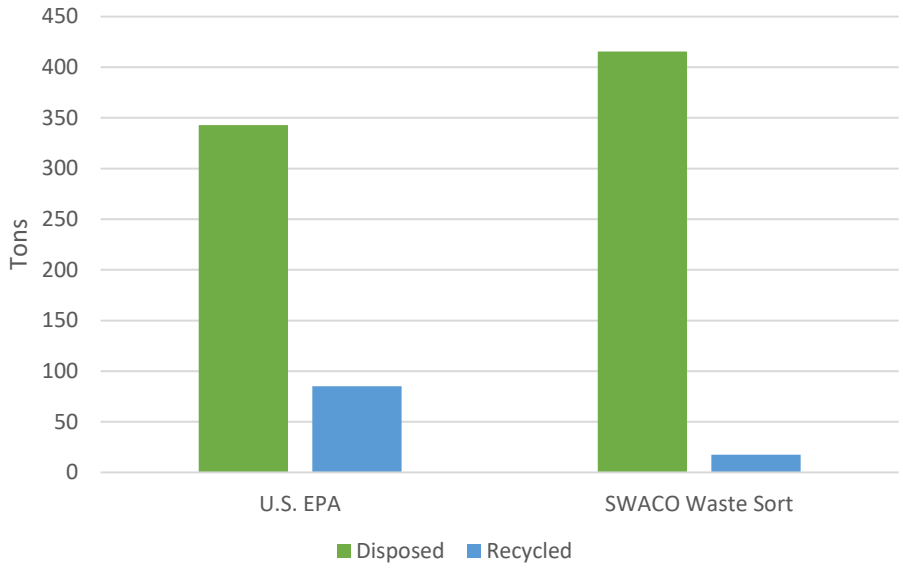
Textiles

U.S EPA estimates that 64 percent of the textiles generated in the residential/commercial waste stream is disposed in landfills, while only 16 percent is recycled. Applying these percentages to Bexley's residential sector suggests that 343

[8] "Electronic Products Generation and Recycling in the United States, 2013 and 2014", U.S. EPA, Office of Resource Conservation and Recovery, December 2016.

tons of textiles from Bexley were disposed in the landfill in 2015 and 85 tons were recycled. (See Figure 3-12 below.) Using the results of SWACO's waste sort estimates a higher number for disposal and a correspondingly lower for recycling.

Figure 3-12. Textile Disposal and Recycling in Bexley



Several opportunities exist within Franklin County for the recycling of clothing, such Goodwill, Volunteers of America, and Planet Aid, Inc. Even though none of these organizations have drop-off locations within the City of Bexley itself, donation centers are available in neighboring communities such as Whitehall.

A company called Simple Recycling offers another option for recycling clothing – curbside collection. This program collects clothing and other small household items on the same day as trash and other recyclable items. There would be no cost to the City of Bexley or its residents, however, the company does require a contract to be signed for an initial four-year period which gives Simple Recycling the exclusive rights to all clothing set out for collection. The company also requires a minimum of 50,000 to 80,000 households to set up a collection program, so Bexley would need to explore one or more partnerships with neighboring communities to pursue this option.

Carpeting is another textile product which could be recovered for recycling in much greater quantities. However, post-consumer carpeting destined for disposal can be difficult to recycle. Disposal of carpeting can create difficulties in terms of management at a landfill. Carpet America Recovery Effort (or CARE) is an example of a non-profit organization whose mission includes, "…to advance market-based solutions that

increase landfill diversion and recycling of post-consumer carpet…" Good opportunities for households to recycle carpet do not currently exist in Franklin County.

6. Eliminating Plastic Bags and Other Packaging

The abundance and use of plastic bags represent a very visible reminder for some people that we live in a wasteful society. Plastic bags can cause unsightly littering, can harm fish and wildlife populations, impact climate change, consume valuable resources, and can create serious problems at facilities which process recyclables. Some political jurisdictions have responded to these concerns by banning the use of single-use plastic bags.

The majority of plastic bag bans in the United States have been enacted by local municipalities, with California having more jurisdictions than any other state with bag bans. As of October 2016, 122 ordinances banning single-use plastic bags have been approved in California, regulating activities in 151 county or local jurisdictions. Jurisdictions in several other states have also enacted some type of bag legislation, including communities in Massachusetts, Maine, Oregon, Washington, Texas, and Colorado.

Nearly all the communities with ordinances addressing this topic ban single-use plastic bags. Many communities have also included a five or ten-cent fee for the use of paper bags, and in some cases, the purchase of reusable bags at the point of sale. The only statewide ban to be implemented thus far is in California, which limits the applicability of the ban to stores with greater than a minimum level of sales (in dollars) or retail floor space.

Although no Ohio communities have yet enacted a bag ban, some cities have (or are) considering it. The City of Athens began discussion of a proposed ordinance during 2016, which would institute a disposable-bag checkout fee of 10 cents per non-reusable bag (for both paper and plastic) paid at the cash register. As of January 2017, the City had not yet moved forward with implementation.

The City of Columbus began evaluating options in 2014 for reducing the use of plastic grocery bags in the city, which included charging fees, providing incentives for using reusable bags or enacting an outright ban. In 2015, the city, Solid Waste Authority of Central Ohio, Ohio Grocers Association and others considered launching a year-long pilot program to evaluate recycling plastic bags instead of banning their use, but instead chose to test an educational program. In 2016, SWACO developed the "Bring Me Back" educational campaign which had two messages:

1. bring back your grocery bags to be recycled, and

2. bring back your reusable bags when you shop in an effort to eliminate the use of plastic bags.

The campaign was rolled out in two local grocery chains (Kroger and Giant Eagle) in October 2016 for a four-week period at 25 Kroger and Giant Eagle locations within central Ohio. The results of this campaign will be evaluated in 2017. Additional information regarding this program can be found at:

https://www.swaco.org/197/Plastic-Bag-Recycling

Some retail establishments in Columbus, such as Lucky's Market in Clintonville and Whole Foods, have voluntarily chosen to eliminate single-use plastic bags in their grocery stores. Others give discounts for customers who bring their own reusable bags.

Do plastic bag bans work? Little evidence is available regarding this question, however, the following excerpt from *Scientific American* is helpful:

> "…It's hard to measure the impact of pre-existing plastic bag bans, but some initial findings look promising. A plastic bag tax levied in Ireland in 2002 has reportedly led to a 95 percent reduction in plastic bag litter there. And a study by San Jose, California found that a 2011 ban instituted there has led to plastic litter reduction of 'approximately 89 percent in the storm drain system, 60 percent in the creeks and rivers, and 59 percent in City streets and neighborhoods.'"[9]

Surveys conducted in the three years of San Francisco's plastic bag ban showed little or no improvement towards the reduction of litter. However, weekly cleanups which took place in Santa Cruz and Monterey counties in California did find fewer plastic bags after bans went into effect.

7. Multi-Family Housing Recycling

As discussed above, data for recycling at MFH units is not currently available in Bexley, but it is generally acknowledged that residents in MFH are under-served with regard to access to recycling opportunities. SWACO has recognized that this is an important issue in Franklin County communities, and its draft solid waste plan update includes the following information:

> "…An analysis of multi-family housing concentrations, barriers, infrastructure, collection options, and other relevant topics to the program design will be

[9] "Do Plastic Bag Bans Work?", *Scientific American,* https://www.scientificamerican.com/article/do-plastic-bag-bans-work/

considered. The study will focus on identifying service issues from haulers, property managers and residents as well as identifying best practice options available. The research…will be completed by 2018. As a result, SWACO will provide assistance programs to ensure multi-family units have opportunities to recycle."

The Hamilton and Lorain County SWMDs in Ohio have grant programs to assist start-up of recycling in multi-family units. The Hamilton SWMD grant program pays for the first six months of a recycling contract if the owner of the housing unit agrees to pay for the next 18 months. This program has worked quite well in Hamilton County.

Another potential option which could improve recycling for the MFH residents involves franchising or forming waste consortiums. A waste consortium typically includes two or more political jurisdictions which jointly solicit bids for trash and recycling collection.[10] The service provider winning the bid has the exclusive rights to collect the trash, recyclables, etc. within the consortium's geographic or franchise area. The City of Bexley is currently part of a waste consortium with Dublin, Gahanna, New Albany, Reynoldsburg, Westerville, Blendon Township, Mifflin Township, Plain Township and Washington Township for collection of trash, recyclables, and yard waste from single-family dwellings.

"…Commercial and residential franchise collection zones are most commonly found on the West Coast. Cities like San Jose, Calif., Portland, Ore., Oakland, Calif., Chico, Calif., Seattle and Santa Barbara, Calif., are some of the many that have franchise collection zones in place."[11] The concept of a waste consortium which included MFH units could be explored as well, and could result in greater access to recycling and lower costs for MFH property managers.

8. Data Collection

The many opportunities to evaluate changes to the way the City of Bexley manages Residential Waste Sector will be dependent on data for good decision making. In some cases, the City has data and can rely on national, regional and local data to make assumptions about the potential success of program changes. In other areas, the data at the national or regional level may not be adequate and the City would benefit from the collection of data to make the analysis of program changes more reliable.

[10] Other materials such as yard waste and/or food waste are often included in these contracts as well.
[11] Szczepanski, Mallory, "Commercial Franchise Zones Explained", *Waste 360*, January 25, 2017.

C. Recommendations for Residential Sector

Green Team to either add, eliminate or adjust recommendations. Green Team to rank where recommendations should fall in the three Phases. Green Team to evaluate the three phases and make recommendations for changes.

The Green Team is recommending that the residential sector recommendations be implemented in three Phases.

Phase 1 – 2018 – 2023 – this phase would incorporate the first five years of this Zero Waste Plan and would provide the Green Team with a goal of implementing immediately attainable and economically viable program changes.

Phase 2 – 2024 – 2030 – this phase would incorporate the second five years of the Zero Waste Plan and would provide the Green Team with a goal of implementing programs that required more study, economic analysis, public vetting and promotion.

Phase 3 – 2031 – 2040 – are programs designed to move the City of Bexley to the waste diversion goal of 90% waste reduction. This Phase may require new facilities, regulations, policies, process changes, and regional cooperation.

Recommended Action	Phase for Implementation
Expand the use of carts to all single-family dwellings.	Yes – Phase 1
The existing collection contract for the City should be reviewed and the following changes should be explored: • The use of a pay-as-you-throw (PAYT) program for trash and recyclables collection; • Semi-automatic or fully-automatic collection	Yes – Phase 1/ 2
Back yard composting should be encouraged for Bexley residents through an improved educational program which could include a "master gardener" program to teach residents about the benefits of using compost for improving soil structure, water-holding capacity, and organic matter content.	Yes, Phase 1
For residents not interested in back yard composting, implement education program encouraging them to participate in yard waste collection at the curb.	Yes, Phase 1

Recommended Action	Phase for Implementation
Pursue the design and development of a food waste collection pilot program, with the intent of offering food waste collection for all residents and businesses	Yes, Phase 1
Develop and implement an education program to emphasize the existing collection opportunities for HHW, electronics, and textiles.	Yes, Phase 1
Explore the possibility of partnering with other communities in Franklin County for a textile collection program using a company such as Simple Recycling.	Yes, Phase 1
Investigate the options available for reducing the use of plastic bags, which could involve meetings with local businesses, obtaining information from SWACO regarding the plastic bag recycling pilot program, obtaining more details from other communities about the implementation of local plastic bag bans. The results of these efforts should determine the next steps that Bexley will take with regard to the use of plastic bags.	Phase 1
Explore the development of a waste consortium or franchising agreement which would include MFH units for the collection of trash and recyclables. The City should also follow SWACO's progress towards addressing this issue, and take advantage of any improvements or programs offered by SWACO.	Phase 2
Provide a City of Bexley electronics drop-off	Phase 1
Increase data collection and issue plan to complete studies	Phase 1
SWACO to address hard-to-recycle materials including but not limited to plastics 3-7	Phase 2
Eliminate backdoor service	Phase 1

SECTION 4 – COMMERCIAL SECTOR

The objectives designed to improve waste management for the commercial sector (i.e., restaurants, theatres, shops, medical businesses, etc.) are as follows:

- Objective 3-1-2017 – Evaluate existing commercial collection services.
- Objective 3-2-2017 – Use waste hierarchy to evaluate commercial sector service improvements (food waste, cardboard, glass, paper, plastic, metals).
- Objective 3-3-2017 – Evaluate eliminating plastic bags and other unnecessary packaging.
- Objective 3-4-2017 – Evaluate opportunities to improve materials management for commercial facilities in strip malls.

As noted in Section 2, the goals and objectives defined for the industrial sector have been incorporated into this section. Discussion of businesses in this section includes industries located in the City of Bexley unless indicated otherwise.

A. Existing Commercial and Industrial Collection Services

Collection of trash and recyclables in the City of Bexley is provided by several private haulers including Waste Management, Local Waste, Rumpke Waste, and Republic Services. It is not uncommon for adjacent businesses to be served by different haulers. In addition, it is also common practice for multiple businesses located in the same building or in adjacent buildings to share one or more dumpsters for trash and/or recyclables.

Since the commercial and industrial sectors are served by several private haulers, disposal and recycling tonnage data is not readily available. Several approaches can be used to approximate the amount of disposal and recycling from the commercial sector (not including industries):

- Develop estimates by applying the percentages of residential vs. commercial amounts included in SWACO's solid waste plan update;
- Develop estimates by applying the percentages of residential vs. commercial amounts based on U.S. EPA publication;
- Apply waste generation coefficients per square feet of business space developed in one or more studies; and
- Conduct a survey to obtain actual data from commercial entities, and then extrapolate the results to predict the total amount of waste.

Using SWACO's Plan Data and U.S. EPA Report

SWACO's plan estimated that 41 percent of residential/commercial disposal came from the residential sector, and the commercial sector contributed 59 percent of this total.[1] U.S. EPA's 2013 report entitled, "MSW Residential/Commercial Percentage Allocation – Data Availability" has a much higher disposal percentage for the residential sector – an average of 51 percent compared to the SWACO Plan. The commercial sector percentage for the U.S. EPA report is lower than the SWACO Plan – an average of 49 percent.

The SWACO Plan also evaluated the source of recyclables from the residential/commercial sector. SWACO estimated that the commercial sector contributed roughly 60 percent of the recyclables, and the remainder was from the residential sector. Although the U.S. EPA report did not provide estimates for recycling, it does include average percentages for generation. Assuming that generation represents the sum of disposal plus recycling, the amount of recycling can be calculated from the generation data in the U.S. EPA report.

Table 4-1 summarizes the results of applying the data from the SWACO Plan and the U.S. EPA report to estimate disposal and recycling in the commercial sector for the City of Bexley. The table shows that the SWACO plan estimated a higher percentage of the total residential/commercial disposal originated from the commercial sector compared to the U.S. EPA report. However, estimates of disposal for multi-family housing in Bexley are approximately 1,100 tons for 2015, and when this tonnage is subtracted from 5,900 tons (since the SWACO plan commercial estimate likely includes multi-family housing), the result approximates the disposal tonnage based on the U.S. EPA report.

Table 4-1. Estimates of Commercial Disposal and Recycling in Bexley

	SWACO Plan	U.S. EPA Report
Disposal		
Average %	59.0%	49.0%
Range (%)		38%-59%
Tons	5,900	4,900
Recycling		
Average %	60.4%	68.9%
Tons	2,024	2,311

Note: Percentages represent the estimated amount contributed by the commercial sector within the disposal and recycling categories.

[1] The SWACO Plan acknowledges some shortcomings in using this approach. For instance, the residential total does not include tonnage collected from multi-family housing units.

Applying Waste Generation Coefficients

Waste generation for the commercial sector can also be estimated by using generation rates developed in studies. These rates are applied to data (e.g., the size of the business based upon the number of employees or the square feet) which are known to have a strong predictive relationship to waste generation. As an example, a preliminary estimate of commercial waste generation using the size of businesses in square feet multiplied by generation rates from Fairfax County, Virginia results in 1,426 tons of commercial waste projected for the City of Bexley commercial sector. This estimate is obviously much lower than those discussed above, suggesting that:

- the generation rates from Fairfax County are not accurate for Bexley;
- not all commercial sector entities were represented in the square footage used to estimate waste generation;
- the estimates calculated using the SWACO Plan and the U.S. EPA report are too high;
- there are other reasons for the differences; or
- some combination of these suggestions.

Surveying the Commercial Sector

The City mailed letters to approximately 200 businesses in Bexley to obtain information regarding disposal and recycling quantities, practices, and gauge potential interest in improved services. The January 2017 letter asked companies and institutions to complete an online survey available through Survey Monkey. As of March 31, 2017, a total of 20 respondents had completed the survey. Table 4-1 summarizes the results of the first part of the survey. For example, the table shows that 13 companies and/or institutions listed paper as one of the materials which they dispose in greatest quantity.

Table 4-1. Survey Summary of Responses

Question/Category		Number of Respondents
What materials do you dispose in greatest quantity?	Paper	13
	Cardboard	11
	Food waste	5
	Bottles and cans	3
	Plastic	4
Materials posing biggest challenges	Paper	5
	Cardboard	6
	Plastic	1
	Food waste	1
	Garbage cans/carts	5

Table 4-1. Survey Summary of Responses

Question/Category		Number of Respondents
How are trash and recyclables collected?	A shared dumpster with another business	7
	One or more dumpsters	3
Number of garbage cans/carts	30 gallon	1
	64 gallon	1
	95 gallon	1
Would you like to have assistance to evaluate recycling for your business or institution?		Yes - 8
Do you currently recycle?		Yes - 14
If the City of Bexley implemented an organics (or food waste) collection program for businesses and institutions, would you participate?	Definitely!	4
	Maybe, but I need more information.	6
	Probably.	1
	Probably not.	5
Under what conditions would you support an organics collection program?	If it reduces your costs or the costs are the same...	9
	If it costs you slightly more...	2
	Would not support it regardless of cost...	1
	I need more information; please contact me.	3

Other results from the survey include:

- Fourteen of the twenty respondents already recycle, but eight respondents indicated an interest in having assistance to evaluate recycling.
- About one-half the respondents expressed an interest in organics, or food waste collection, especially if doing so did not increase costs.
- Based upon the limited response to the survey, estimates of disposal and recycling tonnage from the commercial sector was not calculated.

The survey also included some open-ended questions asking for general comments from respondents. Table 4-2 summarizes these comments.

Table 4-2. General Comments from Commercial Survey

General Comments
"We generate a very small amount of non-recyclable waste. The process in place works fine for us."

Table 4-2. General Comments from Commercial Survey

General Comments
"Please provide curbside recycling - currently one of our employees takes all recycling to recycling center."
"Maybe rebates for companies that recycle? Or include businesses in recycle/trash pickup? Curious if we'd have to separate out our recyclables/garbage more which could be much too labor intensive. Would love for someone to come out w/ suggestions."
"Need commercial recycling for paper, cardboard and plastic."
"Need containers for cans/bottles/paper/cardboard."
"Include a secured shredding option for sensitive documents."
"I would recycle from work, but I don't think there is any pickup on Main Street, and we would need a container."
"Provide curbside recycling to commercial, also."
"Provide a centralized spot for businesses to recycle cardboard/paper waste."

Although portions of the survey results are useful, the low response rate and character of the responses for questions pertaining to quantity of waste do not allow for development of a reliable waste generation projection. (Bexley's Chamber of Commerce is assisting in this effort by encouraging Bexley businesses to complete the survey.)

B. Waste Reduction and Reuse Options - Applying the Waste Hierarchy

Historically, communities have directed more effort and resources towards waste reduction and reuse programs for the residential sector than the commercial sector. As a result, businesses are often underserved by solid waste management services, and programs for waste reduction, recycling, and reuse are many times lacking.

The commercial sector can represent a substantial opportunity to increase waste diversion, not only because of the lack of access to services such as recycling, but also because:

- Collection of materials can be easier and less time-consuming compared to the residential sector since there are fewer stops;
- Generation of materials tends to be more homogeneous than the residential sector (i.e., paper, cardboard, food waste, etc.) at a given establishment; and
- Businesses can be expected to generate certain types of waste materials (e.g., law offices generate paper, grocery stores generate large quantities of cardboard and food waste, and restaurants generate food waste) making it easier to design recovery programs.

Businesses can select from a wide-ranging list of waste diversion programs as listed below, and should prioritize the implementation of programs using the waste management hierarchy. Source reduction or reducing the generation of waste should be the highest priority, followed by reuse, recycling, and composting. Mandatory recycling, disposal bans (e.g., food waste), and exclusive hauler arrangements (or franchising) are strategies which have been used in several communities, and are discussed in the remainder of this subsection.

Mandatory Recycling

Several communities and at least two states in the United States have enacted some form of mandatory recycling which applies to the commercial sector. The State of California enacted legislation in 2011 for mandatory commercial recycling, and regulations implementing the law were adopted the following year. Also in 2012, the California Assembly passed an amendment that requires a business generating at least four (4) cubic yards of commercial solid waste per week to arrange for recycling services. Multifamily residential housing with five (5) or more units, regardless of the amount of waste generated must provide recycling. The law also requires local jurisdictions to provide education, outreach, monitoring, and reporting.

The State of Minnesota passed a mandatory recycling law in 2014 which applied to the following entities and included the following requirements:

- The law applies to commercial buildings with one or more businesses classified in sectors 42 to 81 of the North American Industrial Classification System (NAICS code[2]);
- Businesses located in one of seven counties in central Minnesota;
- Businesses that contract for at least four cubic yards of trash collection per week; and
- A minimum of three recyclable materials must be collected.

Even if tenants contract for their own trash hauling services, the building owner is responsible for ensuring compliance with the recycling law. The commercial recycling law became effective January 1, 2016.

Communities throughout the country have also adopted mandatory recycling ordinances. Some ordinances require businesses to contract for recyclables collection, while others have established percentage recycling requirements for businesses (e.g., 75 percent for businesses in Portland, Oregon). In some cases, communities have

[2] NAICS codes 42 through 81 includes wholesale and retail businesses, transportation companies, health care services, entertainment and recreation, and a wide range of other types of businesses such as finance, real estate, etc.

limited mandatory recycling apply to certain types of businesses such as restaurants and/or bars, or exempt smaller businesses whose waste generation does meet a minimum threshold.

In 2009, a study published by Skumatz Economic Research Associates, Inc. evaluated existing mandatory commercial recycling programs in five cities across the U.S. [3] Through a series of interviews with municipal staff, haulers, recyclers, and businesses, the study team developed a list of best management practices for planning and implementing a mandatory recycling program for the commercial sector. The list is summarized in Table 4-3, and shows that starting this process by forming a stakeholder group of those who will be most affected by the ordinance, is vitally important.

Table 4-3. Mandatory Recycling - Best Management Practices

Best Practice	Explanation
Development/planning	Important to use a stakeholder committee
Inventory	What facilities are available, types of processing used at facilities, types of materials affected, etc.
Space for recycling	Planning for space to accommodate recycling important for certain companies
Menu of options	Flexibility is important to accommodate generation of different materials, etc.
Efficiency	Targeting certain types business or exempting small generators can facilitate implementation
Enforcement	Programs w/o enforcement will not be successful
Reporting	Important to success
Recycling plans	Generator recycling plans promote better tracking and provide more efficient
Education/outreach	Critical for success; lead time of 3 to 6 months

Source: Skumatz, Lisa A., and Freeman, David Juri, "Increasing Recycling in the Commercial Sector: Assessment of Mandatory Commercial Recycling Programs and Exclusive Hauler Arrangements - Final Report," Skumatz Economic Research Associates, Inc., April 28, 2009.

[3] Skumatz, Lisa A., and Freeman, David Juri, "Increasing Recycling in the Commercial Sector: Assessment of Mandatory Commercial Recycling Programs and Exclusive Hauler Arrangements - Final Report," Skumatz Economic Research Associates, Inc., April 28, 2009.

Is mandatory recycling for commercial sector effective? When stakeholders were asked to rate the effectiveness, the Skumatz and Associates study found that the overall average was 4.2 on a scale of one to five, with five being the most effective. It is interesting to note that the lowest effectiveness rating for every community program evaluated was associated with generators, or the business representatives.

Increased diversion was one of the benefits of mandatory recycling for the communities studied by Skumatz and Associates. However, depending upon the design of the program, it could result in higher costs for both businesses and haulers.

Mandatory recycling ordinances and exclusive hauler arrangements (which is discussed below) can be very important for providing recycling and food waste recovery services to businesses located in strip malls. Complying with the ordinance or hauler arrangement is usually the responsibility of the property owner, so the tenant occupying space in the strip mall benefits by having access to recycling, etc.

Food Waste Strategies

U.S. EPA has developed a hierarchy for managing food waste which identifies source reduction as the most preferred goal, and landfilling the least preferable. Each of the management options are described below, and Figure 4-1 shows a graphical representation of the hierarchy.

- *Source Reduction*. Reduce the volume of food waste generated.
- *Feed People*. Donate extra food to food banks, soup kitchens, and shelters.
- *Feed Animals*. Provide food to farmers for animal feed.
- *Industrial Uses*. Provide fats for rendering, biofuel, and food discards for animal feed production.
- *Composting/Digesting*. Convert food scraps into a nutrient rich soil amendment.

Figure 4-1. Management Hierarchy for Food Waste

As suggested above, certain types of businesses tend to generate large quantities of food waste, so it is important to develop strategies for this waste stream in order to meet zero waste goals. Table 4-4 shows the results of a study conducted in Illinois in which two grocery stores and four restaurants were sampled over a two-week time period. Although the sampling occurred 25 years ago, it illustrates the relative portions of food waste and cardboard generated at these businesses.

Table 4-4. Examples of Materials Generated at Groceries and Restaurants

Location	Pounds Collected Over a Two-Week Period			
	Garbage	Food	Other	Cardboard
Jerry's IGA @ Kirby	2,927	4,470	240	6,265
Jerry's IGA @ Philo	8,240	9,290	909	11,923
Bob Evans Restaurant	4,638	4,870	98	1,100
Katsina's Restaurant	1,800	1,473	390	210
Minneci's Ristorante	490	680	113	255
Pizza Hut	680	1,360	61	525

Source: Ty Newell, Elizabeth Markstahler and Matthew Snyder, An Investigation of Commercially Generated Food Waste and Recyclable Materials, Community Recycling Center, December 1992.

RecyclingWorks is useful source of information available to help estimate the quantities of food waste generated from the commercial sector. This program is funded by the Massachusetts Department of Environmental Protection (MassDEP), and offers assistance designed to help businesses and institutions in the state maximize recycling, reuse, and composting opportunities. Their website is available at:

http://recyclingworksma.com/how-to/materials-guidance/food-waste-2/

A portion of the guidance from *RecyclingWorks* for estimating food waste from restaurants is shown in Table 4-5 below.

Table 4-5. Measurement Guide for Estimating Restaurant Food Waste Generation

	Average Measurement		Material
Meals Served	0.5	lbs/meal	Food waste
Full-Time Employees	1,500	lbs/employee/year	Food waste
Disposed Waste [Full Service]	66	% of disposed waste by weight	Food waste
Disposed Waste [Fast Food]	51	% of disposed waste by weight	Food waste

Source: RecyclingWorks, Massachusetts, http://recyclingworksma.com/food-waste-estimation-guide/

Several states, including Massachusetts, Vermont, Connecticut, California[4], and Rhode Island have adopted variations of a food waste disposal ban. In some cases, smaller generators of food waste are exempted from the ban, or communities may be exempt if a composting facility is not located nearby.

A well-known example of city-led food waste collection is occurring in San Francisco, where the city has created the first large-scale urban food waste collection and composting program in the country. While voluntary composting for residents and commercial establishments has been offered since 1999, the city intensified waste diversion efforts in 2009 by passing the first law mandating the collection of food waste and other compostables.

[4] California's law is really a recycling law and not a disposal ban. As of April 2016, businesses in California that generate at least eight cubic yards of organic waste per week are required to recycle organic waste on-site or subscribe to organic waste recycling services.

Austin, Texas represents another municipality which has an organic waste recycling law. The Universal Recycling Ordinance requires all restaurants with at least 5,000 square feet in size to compost food scraps by 2017. Austin's City ordinance was passed as part of the city's Zero Waste Initiative.

Exclusive Hauler Arrangements

Some communities in the U.S. have used exclusive hauler arrangements in the form of franchising or contracting in an effort to improve diversion from the commercial sector. The Skumatz and Associates study discussed above also examined the use of exclusive hauler arrangements through interviews and a literature review. In general, this study found that a key advantage of exclusive hauler arrangements was, "…higher participation and access to recycling; however, the performance in terms of recycling diversion is less clear and seems to depend on the quality (or presence) of incentives."[5] An example of an incentive could allow a higher percentage of recycling revenues to be retained by the hauler if a threshold level of diversion is achieved.

Skumatz and Associates concluded that determining the most appropriate hauler arrangement should be based largely upon the goals established by the city. Table 4-6 lists six possible goals or considerations for a city and whether exclusive or non-exclusive hauler arrangements would be more appropriate for each one. As illustrated in the table, an exclusive hauler arrangement is the preferred approach in all cases except when considering the possible political ramifications and/or the availability of staff to oversee implementation.

[5] Skumatz, Lisa A., and Freeman, David Juri, "Increasing Recycling in the Commercial Sector: Assessment of Mandatory Commercial Recycling Programs and Exclusive Hauler Arrangements - Final Report," Skumatz Economic Research Associates, Inc., April 28, 2009, page 35.

Table 4-6. City Goals for Commercial Sector Recycling vs. Hauler Collection Arrangement

Goal	Arrangement	Explanation
IF the goal is Participation, Access, or Diversion, select ➡	Exclusive	City/County has control over program design/rates and can plan the program for maximum diversion or set rates to create
IF the goal is Lowest Rates, select ➡	Exclusive	Haulers/recyclers can realize economies of scale, routing efficiencies, truck savings, etc
IF the goal is Environmental Effects, select ➡	Exclusive	Reduces the number of trucks on the streets, wear and tear, GHG emissions caused by trucks, etc, through route design,
IF the goal is Program Funding, select ➡	Exclusive	Rates can be designed to cover more than just the costs of collection and can help fund diversion efforts.
IF the primary consideration is Politics, select ➡	Non-Exclusive	Haulers will be less resistant to this approach. There is minimal interference in the free market and all haulers are on
IF the primary consideration is Least Staff/Oversight, select ➡	Non-Exclusive	Staffing and oversight may be lower with non-exclusive agreements unless there are auxiliary regulations to oversee.

Source: Skumatz, Lisa A., and Freeman, David Juri, "Increasing Recycling in the Commercial Sector: Assessment of Mandatory Commercial Recycling Programs and Exclusive Hauler Arrangements - Final Report," Skumatz Economic Research Associates, Inc., April 28, 2009, page 38.

In addition to the cities evaluated by Skumatz and Associates, other communities with exclusive hauler arrangements or franchising include: San Jose, Oakland, Chico, and Santa Barbara in California; Portland, Oregon; and Seattle, Washington. As of January 2017, the City of Los Angeles was moving ahead with a $3.5 billion waste hauling contract, which will include 11 franchise zones split among seven waste haulers, and the City of New York was also taking steps towards the implementation of a franchise system for commercial waste.

In 2009, by the Minnesota Pollution Control Agency (MPCA) commissioned a study which compared open vs. organized (e.g., franchised or exclusive) municipal solid waste (MSW) and recycling collection systems. The analysis revealed that organized collection systems consistently result in lower overall costs to consumers, and recycling capture rates are typically higher. In general, organized collection also reduces noise pollution, road wear, air emissions and fuel consumption.

Hauler Licensing

Some communities require waste haulers to be licensed. As a condition of the license, the hauler is required to collect recyclables from businesses generating solid waste. Usually, city ordinances state that recycling services must be provided "at no additional cost" – essentially requiring the hauler to "bundle" the services under one service fee. Communities which employ some version of hauler licensing include Boulder County, Colorado and Sturbridge, Massachusetts. More information regarding hauler licensing can be found at:

http://www.cartonopportunities.org/sites/default/files/files/Hauler-Licensing-Writeup-FINAL.pdf

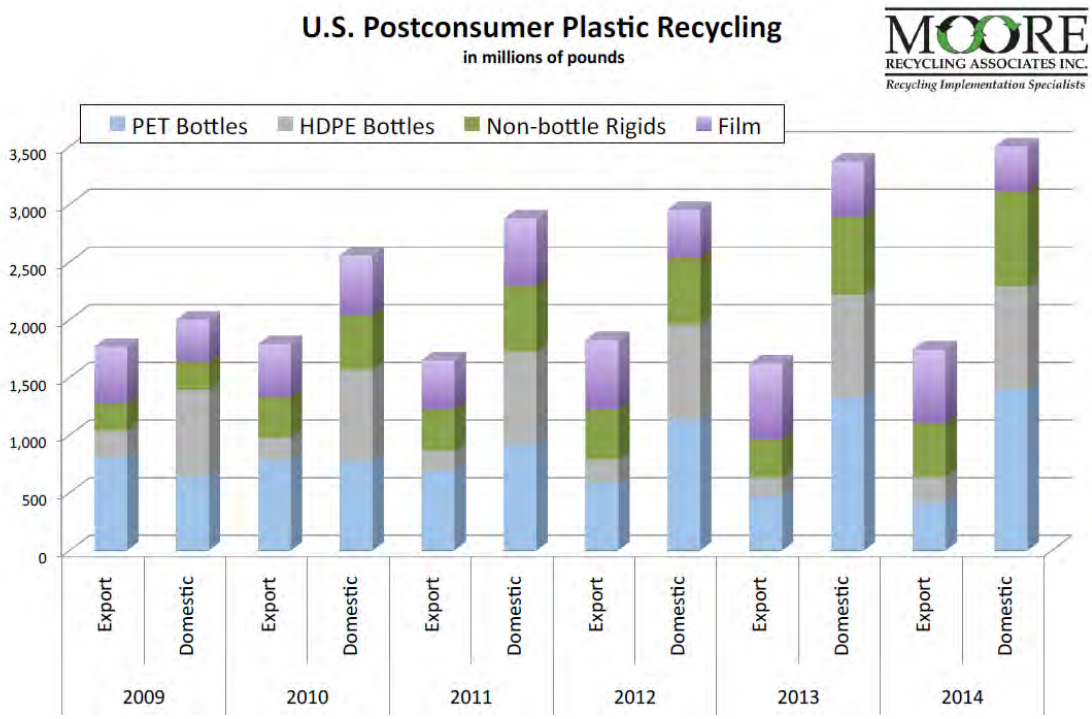
E. Plastics Packaging

Businesses use plastic packaging for shipping products to customers, consumer products are sold wrapped in plastics, and businesses often receive products which are packaged in plastics. Section 3 discussed some communities which have implemented (or considered implementing) a plastic bag ban. However, considerable efforts have been underway to improve the recycling rates for plastic film as well as other types of plastics. Figure 4-2 shows the quantities of recycling for various types of plastic, and indicates that the total pounds recycled increased in the domestic market considerably from 2009 through 2014.

Commercial and/or industrial recycling of certain types of plastics such polystyrene and plastic film have some advantages compared collection of these materials in the residential sector. Some businesses generate large quantities of polystyrene and plastic film from shipments in and out of their establishments. These materials are typically much cleaner than the quality which could be collected from residential sources.

Critical to improving collection of plastics for recycling is good education, which not only applies to the residential sector but also businesses. Consistent and accurate information regarding terminology, types of plastics accepted for recycling, and recommended specifications in preparation of recycling help to result in a product which is of higher quality and consequently higher in value.

Figure 4-2. U.S. Postconsumer Plastic Recycling



Source: More Recycling, 2017.

Many resources are available help businesses design and implement recycling programs for plastics. Links to two websites providing useful information are:

https://www.recycleyourplastics.org/
http://www.plasticsmarkets.org/

F. Recommendations

Green Team to either add, eliminate or adjust recommendations. Green Team to rank where recommendations should fall in the three Phases. Green Team to evaluate the three phases and make recommendations for changes.

The City of Bexley Green Team suggests that the commercial sector recommendations be implemented in three Phases:

- **Phase 1 – 2018 – 2023** – this phase would incorporate the first five years of this Zero Waste Plan and would provide the Green Team with a goal of implementing immediately attainable and economically viable program changes.

- **Phase 2 – 2024 – 2030** – this phase would incorporate the second five years of the Zero Waste Plan and would provide the Green Team with a goal of implementing programs that required more study, economic analysis, public vetting and promotion.

- **Phase 3 – 2030 – 2040** – are programs designed to move the City of Bexley to the waste diversion goal of 90% waste reduction. This Phase may require new facilities, regulations, policies, process changes, and regional cooperation.

At the end of this subsection, a table summarizes the recommendations and includes the phase when each program is expected to be implemented.

Green Teams

Each business should consider the establishment of a green team or a sustainability committee to oversee the development of improved waste diversion plans. Employees may have more knowledge regarding the challenges faced by their business with regard to waste management, and should have a vested interest in the success of diversion programs. As part of its responsibility, the green team could be charged with developing waste diversion goals for the company.

Business green teams should work closely with the City's green team, and should also consider coordinating with other businesses for provision of services and implementation of programs. (See Appendix I for more discussion of green teams.)

Mandatory Recycling, Exclusive Hauler Arrangements, and Licensing

The City should explore each of these options in greater detail by initiating the following steps:

- Develop a business plan for implementing mandatory recycling, franchising, and/or hauler licensing, with tasks to be accomplished and an implementation schedule.
- Gather more information regarding mandatory recycling ordinances, exclusive hauler arrangements (or franchising), and hauler licensing from communities that have implemented these programs. Conducting an in-depth literature review and interviews with appropriate program managers is recommended.
- Invite representatives from the business community, haulers, community leaders, and SWACO to form a stakeholder group to begin discussions addressing these topics.

More information and resources for implementing this strategy can be found in Appendix B, Commercial Sector Resources.

Reuse and Source Reduction

Companies should consider all opportunities for expanding reuse and source reduction of waste materials. Habitat for Humanity and other reuse programs provide excellent opportunities to avoid disposal of certain types of materials. For food items, the Mid-Ohio Foodbank accepts donations from grocers, food distributors, farmers, and community members. More information about food donations to the Mid-Ohio Foodbank is available at:

http://www.midohiofoodbank.org/get_involved/food/

Although usually associated with industry, a formal waste exchange with materials listed in an online database could increase reuse within the residential and commercial sectors, and could be developed through a green team working with a host organization or institution. Appendix G discusses a new online materials exchange launched in 2017 by Ohio EPA. (Although portions of Appendix G is intended for schools, it provides additional information for reuse and source reduction activities for business as well.)

Waste Audits

Waste audits can provide better understanding of the materials which are in the trash, and determining the types of materials available for recovery. The materials generated by companies may be very different due to the nature of their business. Conducting one or more waste audits, especially for large businesses, should allow better design of and results from recycling, waste diversion programs, and especially source reduction programs. According to U.S. EPA, "…Waste audits are the key to establishing a successful source reduction program. They involve assessing the material flow…" (See Appendix E contains additional information for waste audits and waste sorts.)

Food Waste Programs

Food waste comprises a substantial portion of the waste stream for some businesses such as restaurants, bars, and grocery stores. The City should consider initiating a food waste recovery program by implementing the following:

- Develop a short and long-term business plan for the commercial sector;
- Conduct an inventory of businesses to be targeted by the food waste program;
- Conduct selected waste audits at one or more targeted businesses;
- Implement a pilot project for food waste collection;
- Revise long-term plan, if necessary, based upon pilot project results, and implement long-term plan.

In developing this program, the City should consider promoting food reuse and food donations. In addition, the merits of adopting some form of a food waste disposal ban or a mandatory food waste composting ordinance should be explored. Such a ban or ordinance could be phased in over a period of years, and/or could apply to establishments greater than a specified size. Appendix L includes resources and information which could be useful for developing a food waste program in the City.

Special Wastes, including Electronics

Large businesses can generate a substantial amount of materials characterized as "special wastes", which include fluorescent bulbs and electronic (or E-waste). If not already in place, businesses should design programs to manage these types of materials effectively. Appendix F provides suggestions and resources for special waste programs.

Contracting, Auditing, and Dumpster Service

Cardboard comprises a substantial portion of the recyclables generated at some companies, especially grocery stores. One or more employees should be assigned responsibility for ensuring that all boxes are broken down prior to placement in a recycling cart or dumpster. In addition, someone should be assigned responsibility for visually inspecting dumpsters each day to determine:

- The fullness of dumpsters each time emptied
- Contamination level in recyclables dumpster
- Quantity of recyclables in trash dumpster
- If cardboard boxes are being broken down

The information from a visual inspection program can be used to refine existing recycling collection programs, and potentially provide input for engaging contracting

services or modifying contracts. For example, companies may want to reduce the pickup frequency for trash if visual inspection finds that dumpsters are less than half full each time emptied.

Each business or property management company using services from a private hauler should also evaluate invoices submitted by contractors to ensure that the costs are consistent with service provided. Procedures for systematic auditing of invoices can often be very helpful in identifying discrepancies, and may lead to cost savings and modification of contracts to better align with needs.

Businesses should coordinate with the City's Green Team to explore joint contracting options for collection of trash and recyclables. It is possible that this approach, especially in conjunction with exclusive hauler arrangements (or franchising), could result in lower costs for collection.

Purchasing Recycled-Content Products

If not already in place, companies should consider policies addressing the purchase of recycled-content products, or environmentally-sustainable products. Many organizations have such a policy which helps to ensure that the purchase of products is in keeping with the goals of sustainability, and also promotes the markets of recycled-content products. The policy should include the purchase of materials for all new construction and renovation of buildings. (See Appendix D for more information regarding environmentally-sustainable purchasing policies.)

Construction and Demolition Debris

Businesses that own buildings and property management companies should consider establishing specifications for all construction projects on their properties, which require construction and demolition debris to be reused or recycled. Many examples of these types of policies are available online.

Trash and Recycling Containers

All businesses should have containers within the workplace for recycling. The placement of a trash container should always include an adjacent recycling container. All trash and recycling containers need to have consistent labeling, consistent color schemes, and consistent container styles. Containers should be placed in offices, conference rooms, break rooms, next to vending machines, and in public areas. (See Appendix J for more information regarding this topic.)

Communication and Company Website

Information about the company's waste management goals and waste diversion activities needs to be communicated effectively to all employees. Communication should occur periodically throughout the year not only to remind employees regarding the importance of these activities, but also provide updates towards meeting goals. A company website and/or newsletter offer two possible approaches for informing employees.

Plastics Recycling

The City's Green Team should facilitate development and/or improvement of plastics recycling within the business sector. Improved recycling could occur by ensuring businesses have access to necessary information regarding product specifications and markets, or businesses know where to find this information.

Another possible role for the City would be facilitating the development of some type of cooperative among several businesses. The objectives of the cooperative could include:

- Generating higher quantities of material than possible from one single business, perhaps resulting in better transportation costs and selling price;
- Locating one "collection center" which could be used instead of individual businesses having their own collection location; and
- Changes in the plastics recycling markets could be shared without each company needing to devote resources to track this information.

Institutions could be invited to participate in this cooperative as well.

Table 4-7. Recommendations for Commercial Sector

Recommended Action	Tasks/Description	Phase
Establishment of Green Teams	Form green teams within each commercial and industrial business	Phase 2
Mandatory Recycling, Exclusive Hauler Arrangements, and Licensing	1. Gather more information (e.g., in-depth literature review, conduct interviews, etc.)	Phase 1
	2. Develop a business plan with tasks to be accomplished and an implementation schedule.	Phase 1

Recommended Action	Tasks/Description	Phase
	3. Form a stakeholder group to begin discussions addressing these topics (representatives from the business community, haulers, community leaders, and SWACO).	Phase 1
	4. Implement mandatory recycling program for commercial/industrial sector with requirements for waste haulers.	Phase 1
Reuse and Source Reduction	Expanding reuse and source reduction of waste materials within businesses.	Phase 1
Waste Audits	Conduct general business-specific waste audits.	Phase 2
Food Waste Programs	1. Develop a short and long-term business plan for the commercial and industrial sector.	Phase 1
	2. Conduct an inventory of businesses to be targeted by the food waste program.	Phase 1
	3. Conduct selected waste audits at one or more targeted businesses.	Phase 2
	4. Implement a pilot project for food waste collection.	Phase 1
	5. Revise long-term plan, if necessary, based upon pilot project results, and implement long-term plan.	Phase 2
Special Wastes, including Electronics	Implement special waste recycling and reuse programs to manage these types of materials effectively.	Phase 2
Contracting, Auditing, and Dumpster Service	City's green team work with businesses to improve these elements of waste management.	Phase 2
Purchasing Recycled-Content Products	Adopt policies promoting purchase of recycled-content, or environmentally-sustainable products.	Phase 2
Construction and Demolition Debris	Establish specifications for all construction projects which require construction and demolition debris to be reused or recycled.	Phase 2
Trash and Recycling Containers	Require a policy for the pairing of trash and recycling containers, ensuring appropriate number of containers, consistent colors, styles, and sizes of containers	Phase 1
Communication plan within each business	Develop communication plan as part of Education Program targeted at business owners and waste management programs	Phase 2

Recommended Action	Tasks/Description	Phase
Plastics Recycling	Promote education and development of greater plastics recycling.	Phase 1

SECTION 5 – INSTITUTIONAL SECTOR

The institutional sector in the City of Bexley includes city government, public and private schools, and Capital University. Section 2 of this ZWP established a goal for improving recycling and waste reduction associated with this sector, and identified four objectives to support achieving the goal:

- Objective 4-1-2017 – Evaluate existing institutional collection services.
- Objective 4-2-2017 – Use waste hierarchy to evaluate institutional sector service improvements.
- Objective 4-3-2017 – Evaluate contract opportunities to improve materials management for institutional facilities.
- Objective 4-4-2017 – Evaluate recycling and waste management for special events in Bexley held by the City and other institutions.

A. Capital University

Capital University is a private four-year undergraduate institution and graduate school located in the southwestern corner of the City of Bexley. The student body consists of approximately 3,600 students, with 1,600 students living on campus. The total daytime campus population during fall and spring semesters is about 5,000, which includes not only students but also faculty and staff.

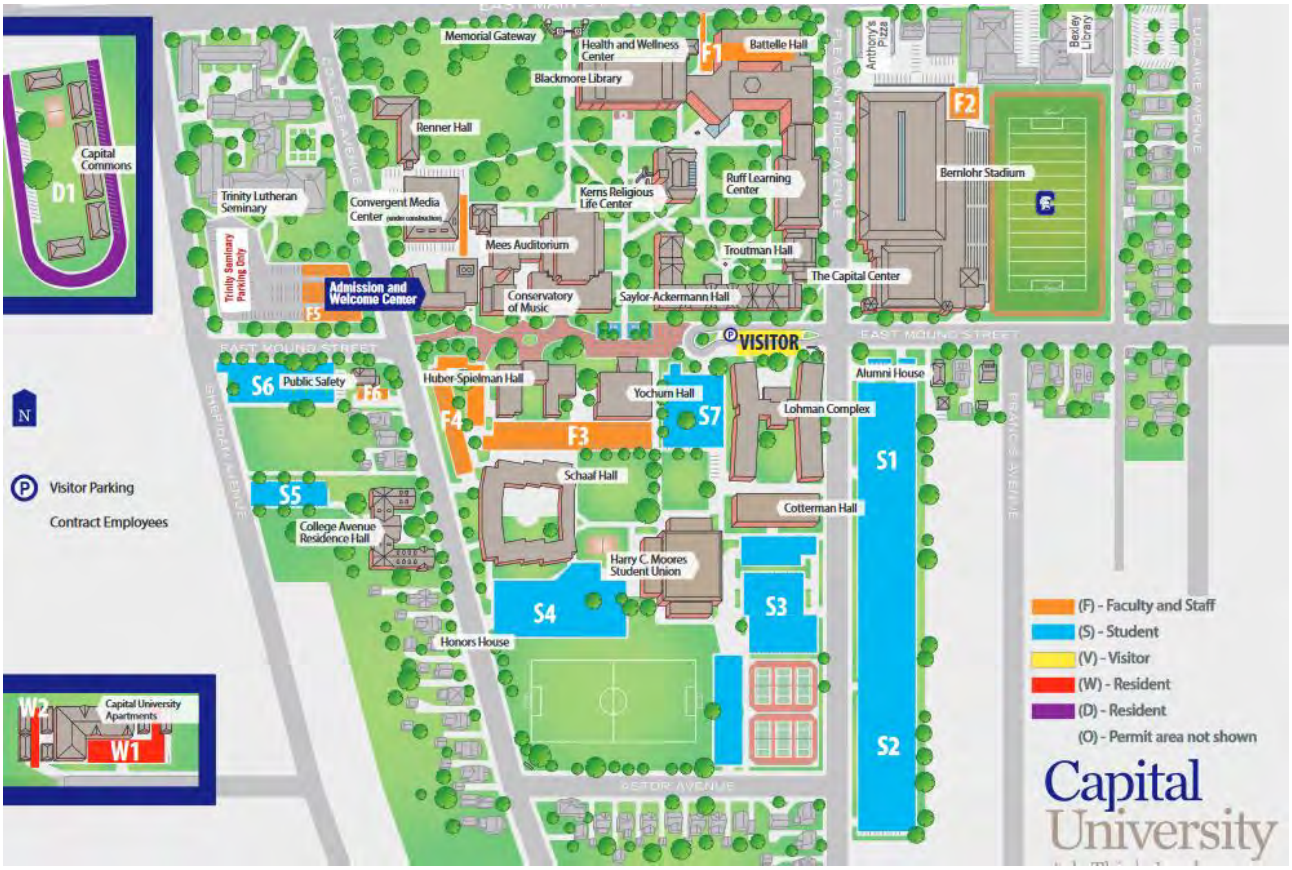
The campus includes six dormitories, one main dining hall, three administrative buildings, 22 classroom buildings, and a total of 31 buildings. Students also live in 30 houses on campus. In addition, the campus encompasses roughly three to four City blocks, or 54 acres.[1] (See Figure 5-1 below.)

Sustainability Council

The Sustainability Council was co-founded in 2013 by a biological and environmental professor, Christine Anderson, and former philosophy professor, Monica Mueller. According to Terry Lahm, Associate Provost in 2016, "The purpose of the council is to create a permanent structure that will centralize and promote the environmental and sustainable initiatives taking place across the university." Although the most notable efforts of the Council thus far involve reducing energy usage at Capital, Council members are also interested in promoting more sustainable solid waste management practices on campus.

[1] The acreage for campus does not include the 30 houses occupied by students.

Figure 5-1. Map of Capital University Campus



Recycling on Campus

Recycling opportunities are available on campus in residence halls, classroom buildings, and in various locations, including walkways between buildings. Containers for recyclables are sometimes paired with a trash container, but in many instances, only a trash container is placed at a given location on campus. Although recycling and trash containers are labeled, the containers generally have no other distinction; for the most part, the trash and recycling containers are the same color. (See Figure 5-2.)

Figure 5-2. Trash and Recycling Containers on Capital University Campus

Several different types of recycling containers can be found in buildings and across the Capital campus. Figure 5-3 illustrates this variety in container design, size, color, etc. These containers as well as the containers outside are designed to accept only glass bottles, aluminum cans, and plastic bottles. No recycling containers are included in classrooms.

Figure 5-3. Examples of Recycling Containers in Buildings

Opportunities to recycle paper are available in the residence halls and the library in areas which include computers, copiers, and printers. (See Figure 5-4.)

Figure 5-4. Paper Recycling at Capital

Students living in the residence halls are required to collect the trash and recyclables which they generate, and place these materials in the proper containers/location. Students must dispose of their trash in dumpsters located outside the residence halls. Carts for recyclables are available on the first floor of the residence halls in a designated room. (See Figure 5-5.) A total of six buildings on campus include recycling rooms.

The University currently has five dumpsters located next to the Student Union: three, 6 cubic yard dumpsters for trash; one, 8 cubic yard dumpster designated for cardboard; and one, 8 cubic yard dumpster for mixed recyclables. The dumpsters are located, and

are serviced under a contract with the hauling company, Local Waste. Custodial Services employs two individuals who transport trash and recyclables from buildings each day and deliver the materials to the dumpsters.

Figure 5-5. Recycling Room in Residence Hall

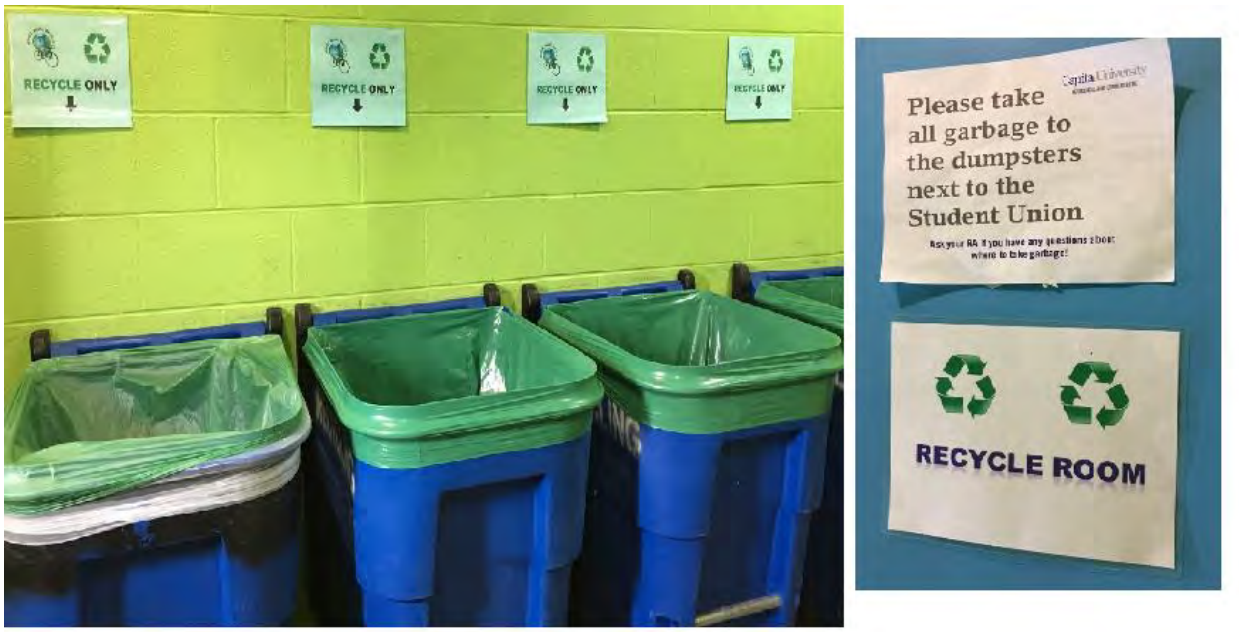


Table 5-1 shows estimates of the total amount of trash collected annually at Capital based upon the pickup frequency of each dumpster. The table includes three alternative sets of estimates for the cubic yards collected based upon assumptions regarding the fullness of dumpsters when emptied: 50% full, 75% full, and 100% full.

Table 5-1. Trash Collection at Capital University (in cubic yards)

Location	Dumpster Size	# of Dumpsters	Pulls/Wk		Total Trash Collected based on % fullness of dumpsters (in yd^3)		
			School Yr.	Summer	50	75	100
CU Apartments, 2130 Astor Ave.	8	1	6	3	1,068	1,602	2,208
CU College Ave. Dorm	8	1	6	3	1,068	1,602	2,208
CU Campus Center Loading Dock	6	3	6	3	2,403	3,605	4,968
CU University Capital Commons	6	1	6	2	756	1,134	1,584
CU Capital Center (Gym)	8	1	6	6	1,248	1,872	1,920
CU Battelle Hall	6	1	5	3	690	1,035	1,920

Table 5-1. Trash Collection at Capital University (in cubic yards)

Location	Dumpster Size	# of Dumpsters	Pulls/Wk		Total Trash Collected based on % fullness of dumpsters (in yd^3)		
			School Yr.	Summer	50	75	100
CU Cotterman/Lohman	8	1	6	3	1,068	1,602	2,208
CU Loading Dock	8	2	6	3	2,136	3,204	4,416
CU Physical Plant	8	1	5	5	1,040	1,560	2,080
Totals		***12***	***52***	***31***	***11,477***	***17,216***	***23,512***

Information regarding the collection of recyclables at Capital is summarized in Table 5-2. Estimates are presented assuming three different scenarios: dumpsters emptied when 50% full, 75% full, and 100% full.

Table 5-2. Recycling Collection Estimates at Capital University (in cubic yards)

Location	Dumpster Size	# of Dumpsters	Pulls/Wk		Total Recyclables Collected based on % fullness of dumpsters (in yd^3)		
			School Yr.	Summer	50	75	100
CU Campus Center Loading Dock	8	1	2	1	356	534	736
CU Campus Center Loading Dock - Cardboard	8	1	3	1	504	756	1,056
CU University Capital Commons	4	1	1	1	104	156	208
CU Battelle Hall	8	1	1	1	208	312	416
Totals		***4***	***7***	***4***	***1,172***	***1,758***	***2,416***

Management of Organics

Aramark is currently under contract to provide food services for the main dining hall at Capital. The contractor delivers food to the campus, and then prepares meals on site. The dining hall currently utilizes reusable dishware which helps to reduce the amount of waste generated. However, there is no recycling or food waste recovery in the dining hall for pre- or post-consumer waste at the present time.

In 2014, Carly Moss, a student at Capital wrote a report entitled, "Analysis of Implementing Composting at Capital University" as an Honors Capstone Project. This study analyzed the generation of food waste in the dining hall and yard waste on

campus, and evaluated options for implementing a composting program at the University. Based upon sampling conducted on two separate days, Moss estimated annual compostable waste from the dining hall to be approximately 33.5 cubic yards.[2] Moss also evaluated several potential locations for a composting operation on campus, and recommended the use of two to three plastic composting bins for this project.

Discussions are underway at Capital among an Aramark representative, a Facility Management representative, and Capital professors to develop a plan for initiating food waste recovery at the dining hall and also at outdoor events. Preliminary strategies include:

- Conducting food waste sampling at the dining hall before the end of the 2017 spring semester to provide another estimate of food waste generation quantity;
- Investigate collection and hauling options for food waste;
- Initiate a pilot program for food waste recovery during summer semester; and
- Explore options for recovering food waste from outdoor events at Capital.

The landscaping on campus is provided by a private contractor, Viox, and all yard waste is removed by the contractor.

B. Columbus School for Girls

Columbus School for Girls (CSG) is a private school for pre-school through grade 12. It is located on an eight-acre campus, just south of Broad Street in the northern portion of central Bexley, with an enrollment of about 560 students. Faculty and staff comprise approximately 130 individuals as well, with everyone essentially housed in one large building.

Recycling at CSG

CSG has recycling containers scattered throughout the building. However, there doesn't seem to be a consistent pattern regarding the placement of containers. For instance, some offices may include a recycling container while others do not. Some hallways have a recycling container and others do not. Also, recycling containers are generally not paired with the placement of trash containers.

The types of recycling containers are quite varied at the school in terms of size, color, and style. (See Figure 5-6.) Teachers are responsible for emptying recycling containers or bins into larger, centralized containers.

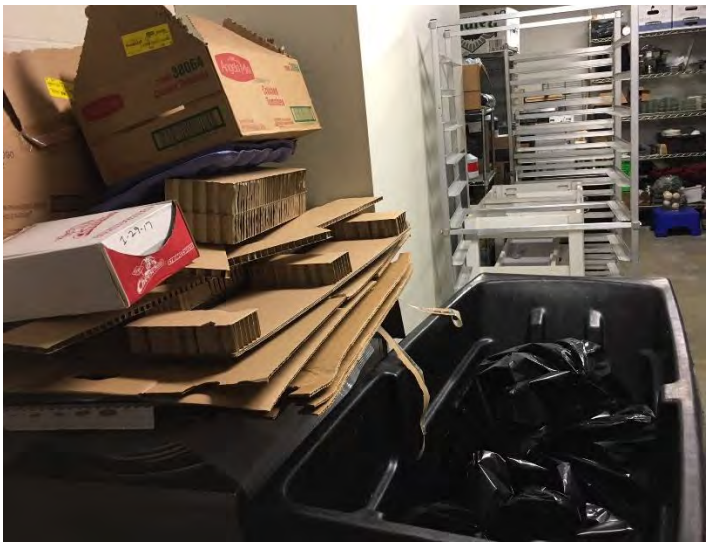
[2] Meat, dairy products, and fats and oils were excluded from the estimate of compostable waste.

Figure 5-6. Recycling Containers at CSG

The Kitchen

The kitchen at CSG serves approximately 700 meals per day, and food waste has been estimated at 85 to 90 pounds per day based upon measurements conducted for one day. Extrapolating this estimate for the entire school year results in a total of more than 15,000 pounds of food waste, or 7.65 tons. Currently the only materials recycled by the CSG kitchen is cardboard even though steel cans and plastics are generated as well. (See Figure 5-7.) The kitchen staff is interested in recovering food waste, and discussions are ongoing regarding options for composting this material on-site or hauling it to another location for processing.

Figure 5-7. Cardboard Collection in Kitchen at CSG



Yard Waste

CSG has a contract with a company which provides landscaping, and most of this material is removed off-site. The school also has the option of placing bags of yard waste at the curb for pickup by the City's contract hauler.

Trash and Recyclables Estimates

Hand carts are used in the school to collect bags of recycling and trash from containers throughout the building. The bags are delivered to dumpsters located outside the building where they are manually separated into a trash dumpster and recyclables dumpster.

Table 5-3 shows annual estimates for the trash and recyclables collected in cubic yards. Estimates of the total annual costs for collection are included as well.

Table 5-3. Trash and Recyclables Collection at CSG

Material Collected	Dumpster Size	Pulls/Week		Estimated Cubic Yards	Total Costs
		School Yr.	Summer		
Trash	8	5		1,760	$66,500
Recyclables	8	2		704	$32,627

C. Bexley Public Schools

Bexley Public Schools, which encompasses three elementary schools, one middle school, and one high school, had a total enrollment of 2,360 students as of August, 2016. (See Table 5-4.)

Table 5-4. Bexley Public Schools

Schools	# of Students	Separate Campus?
Bexley High School (grades 9 - 12)	732	Same campus (Cassingham Complex)
Bexley Middle School (grades 7 - 8)	359	
Cassingham Elementary School (grades K - 6)	483	
Maryland Elementary School (grades K - 6)	366	Separate campus
Montrose Elementary School (grades K - 6)	420	Separate campus
Total	***2,360***	

Recycling at Bexley Schools

Trash cans are available at the outside entrance to the high school. However, recycling containers are not provided at this location. (See Figure 5-9 below.)

Figure 5-9. Outside Trash Cans – Bexley Schools

Trash and recycling containers are available in the hallways at Bexley Schools. In some cases, a recycling container is paired with a trash container, however, this practice has not been followed consistently throughout the buildings. (See Figure 5-8.) Colors schemes and labelling (or signage) for the containers is not consistent as well.

Figure 5-8. Trash and Recycling Containers – Bexley Schools

The copy room at Bexley High School includes a recycling container for paper, and the bulletin board above the copy machine encourages recycling. (See Figure 5-10.)

Figure 5-10. Copy Room – Bexley High School

Recycling containers throughout the Cassingham Complex are generally taken outside and emptied into recycling dumpsters by high school students who are members of the Environmental Club Group.

The hallway outside the elementary school at the Cassingham Complex includes six 95 gallon carts for recyclables. When full or partially full, the custodial staff rolls these carts outside and empties them into recycling dumpsters. (See Figure 5-11 below.)

Figure 5-11. Recycling Carts – Cassingham Elementary School

Food Waste

The cafeteria at the Cassingham Complex currently prepares approximately 350 lunches each day and 40 to 50 breakfast meals. The Maryland and Montrose Elementary Schools prepare about 200 lunches daily as well as 35 breakfast meals. The kitchen staff at the Cassingham Complex currently collect approximately 15 gallons of food waste each day which is ultimately fed to chickens.

Estimates of Trash and Recyclables

The Cassingham Complex currently includes two dumpsters for trash and five dumpsters for recyclables. Both the Maryland and Montrose Elementary Schools have one trash and one recycling dumpster each. Table 5-5 shows dumpster sizes, the number of dumpsters, and the number of pulls/week (or pickup frequency) at each location for trash, recyclables, and yard waste. Annual costs have also been calculated based a recent invoice and the factors shown in Figure 5-5.

Table 5-5. Dumpster Service and Annual Costs

Location	Dumpster Size	# of Dumpsters	Pulls/Wk		Total Costs
			School Yr.	Summer	
Trash					
Cassingham Complex	8	2	5	3	$35,566
Montrose Elementary	6	1	3	2	$10,787
Maryland Elementary	6	1	3	2	$10,787
Warehouse	6	1	1	1	$3,790
Recyclables					
Cassingham Complex	2	1	2	1	$6,997
Cassingham Complex	4	4	2	1	$27,987
Montrose Elementary	2	1	1	1	$3,790
Maryland Elementary	2	1	1	1	$3,790
Yard Waste					
Warehouse	2	1	2	1	$6,997
Totals		***13***	***20***	***13***	***$110,489***

The quantity of trash, recyclables and yard waste has also been estimated for Bexley Schools based upon the data in Table 5-5. Assuming that the dumpsters are completely full each time they are emptied, Bexley Schools generates nearly 6,000 cubic yards of trash each year. The recycling volume from the schools is approximately 1,900 cubic yards, assuming the dumpsters are always full when emptied. Yard waste generation is estimated at roughly 190 cubic yards per year.

D. City of Bexley Activities and Special Events

The City of Bexley hosts several events each year which involve the participation of many residents and businesses. Departments such as Recreation and Parks also operate numerous programs for Bexley residents. These activities have the potential to generate substantial quantities of both trash and recyclables.

Some of the special events held in the City during the year are listed in the table below. Each event represents an opportunity to educate residents and instill a greater commitment towards sustainability.

Event	Month(s)
Greater Bexley Community Cleanup – Earth Day	April
Farmers Market	May-October
Bexley Community Freecycle Day	May-October
Home and Garden Tour	June
4th of July Community Celebration	July
Bexley Day	August
Labor Day Block Party	September
Harvest Festival	October

E. Recommendations

Green Team to either add, eliminate or adjust recommendations. Green Team to rank where recommendations should fall in the three Phases. Green Team to evaluate the three phases and make recommendations for changes.

Some recommendations apply equally to each of the institutions discussed above, and should be considered for implementation. These "common" recommendations are discussed in the first section below, while recommendations unique to each institution are included in separate sections which follow. The City of Bexley Green Team suggests that the institutional sector recommendations be implemented in three Phases:

- **Phase 1 – 2018 – 2023** – this phase would incorporate the first five years of this Zero Waste Plan and would provide the Green Team with a goal of implementing immediately attainable and economically viable program changes.
- **Phase 2 – 2024 – 2030** – this phase would incorporate the second five years of the Zero Waste Plan and would provide the Green Team with a goal of implementing programs that required more study, economic analysis, public vetting and promotion.
- **Phase 3 – 2030 – 2040** – are programs designed to move the City of Bexley to the waste diversion goal of 90% waste reduction. This Phase may require new facilities, regulations, policies, process changes, and regional cooperation.

At the end of each of the following subsections, a table summarizes the recommendations and includes the phase when each program will be implemented.

Recommendations for Capital University, Columbus School for Girls, and Bexley Schools

Contracting, Auditing, and Dumpster Service. Cardboard comprises a substantial portion of the recyclables generated at Capital University, Columbus School for Girls, and Bexley Schools. Although some of the carboard boxes are broken down prior to placement in the recycling dumpster, this practice is not followed consistently. A Green Team or an education committee should continually emphasize the need for breaking down the boxes. If boxes are not broken down, the dumpster fills faster and when picked up a significant portion of the collected material is air. In addition, someone should be assigned responsibility for visually inspecting the dumpsters each day to determine:

- The fullness of dumpsters each time emptied
- Contamination level in recyclables dumpster
- Quantity of recyclables in trash dumpster
- If cardboard boxes are being broken down

The information from a visual inspection program can be used to refine existing recycling collection programs, and potentially provide input for engaging contracting services or modifying contracts. For example, the institution may want to reduce the pickup frequency for trash if visual inspection finds that dumpsters are less than half full each time emptied.

Each institution should also evaluate invoices submitted by contractors to ensure that the costs are consistent with service provided. Procedures for systematic auditing of invoices can often be very helpful in identifying discrepancies, and may lead to cost savings and modification of contracts to better align with an institution's needs.

These institutions should coordinate with the City's Green Team to explore joint contracting options for collection of trash and recyclables. It is possible that this approach, if available, could result in lower costs for collection. At a minimum, these institutions should consider soliciting multiple bids for dumpster service.

Purchasing Recycled-Content Products. If the University, CSG, and Bexley Schools do not currently have policies addressing the purchase of recycled-content products, or environmentally-sustainable products, one should be developed and adopted. Many organizations have such a policy which helps to ensure that the purchase of products is in keeping with the goals of sustainability and also promotes the markets of recycled-content products. The policy should include the purchase of materials for all new

construction and renovation at the institution. (See Appendix D for more information regarding this topic.)

Waste Sorts. Waste sorts can be valuable educational tools, help to identify problems or challenges (e.g., contamination), and lead to development of additional programs. These events should be conducted in high-visibility areas so students can view the process and ask questions. As a result, waste sorts can be useful as an awareness tool, as well as a planning tool to determine which recyclable materials are being disposed or which buildings may benefit from more education regarding proper placement of refuse and recyclables as well as delivery to the loading dock for pickup. The findings from waste sorts should be publicized through a posting in the student/local paper, information added to the institutions website, and by creating a display for libraries. (See Appendix E for more information regarding this topic.)

Construction and Demolition Debris. The University, CSG, and Bexley Schools should each establish specifications for all construction projects on their properties, which require construction and demolition debris to be reused or recycled. Examples of these types of policies are available from political jurisdictions and other institutions throughout the United States. Construction and demolition materials can be generated in large quantities in some communities, and can provide opportunities for substantial amounts of recycling and reuse. Recycling Construction and Demolition Wastes: A Guide for Architects and Contractors estimates that "…90% to 95% of all construction and demolition waste materials can be recycled." Nationwide, approximately one-half of C&D results from construction and renovation projects, while demolition projects also contribute about one-half of the total.

The institutions should consider developing:

- a data collection system for C&D materials in order to track the amount generated, disposed, recycled, and reused. This type of information would facilitate establishing higher rates of recovery.
- a materials recycling specification for all construction and demolition projects.
- a means to provide technical assistance to contractors and construction firms to improve recycling of construction and demolition debris, giving priority to salvage and reuse of materials.

Special Wastes. Schools and institutions generate a substantial amount of materials generally characterized as "special wastes", which include fluorescent bulbs, laboratory wastes, and electronic (or E-waste). If not already in place, institutions should design programs to manage these types of materials effectively. Appendix F provides suggestions and resources for special waste programs.

Reuse and Waste Reduction. Any institution which pursues an agenda of zero waste or sustainability recognizes that some waste materials cannot be recycled and cannot be composted. To address these materials, reuse and waste reduction efforts become vitally important. Appendix G provides suggestions for implementing these programs.

Data Collection. The success of any waste management program cannot be properly determined without data. These Bexley institutions should consider developing more comprehensive programs to collect information for the amount and types of waste disposed, recycled, and reused. The contracts for hauling waste and recyclables should include a reporting requirement in cubic yards and tons, if possible. If the hauler cannot provide the tonnage, the monitoring system discussed above for visual inspection of dumpsters becomes important with respect to compilation of accurate data.

The management of construction and demolition materials should be included in the data collection efforts. The compilation and subsequent analysis of data, supplemented with the findings from waste sorts, can provide very useful information for re-focusing existing programs or implementing new programs. Each of these institutions and the City's Green Team should also consider establishing a system (or process) for sharing data collection results. (See Appendix H for more information regarding this topic.)

Communication Plan. Any institution or business putting in place a zero waste or sustainability plan should develop a communication plan. This document needs to establish the process and the tools which will be used to educate the students, staff, faculty, and/or employees with regard to the purpose of zero waste or sustainability plan, its schedule, and the importance of everyone's participation. Suggestions for a communication plan are included in Appendix N.

Sporting Events, Concerts, etc. The Green Team at each institution should inventory campus events, prioritize these events according to the amount of waste generated, and identify strategies to improve diversion. Each institution should consider an "Adopt-a-Game" program for basketball and football games and other sizable sporting events; student groups and organizations can "adopt" home games and volunteer to take trash and recycling from spectators in stands before it is improperly disposed. Volunteers can carry a trash and recycling bag and provide proper sorting as they collect materials. Results can be weighed or full bags can be counted so student groups could compete with one another to determine who diverted the most materials. (See Appendix K for more information regarding this topic.)

The listing of recommendations common to all of these institutions is included in Table 5-6. The phase when each program will be implemented is included in the table.

Table 5-6. Recommendations Common to Capital University, CSG, and Bexley Schools

Recommended Action	Phase for Implementation
Contracting, Auditing, and Dumpster Service	Phase 1
Purchasing Recycled-Content Products	Phase 1
Waste Sorts	Phase 1
Construction and Demolition Debris	Phase 2
Special Wastes	Phase 1
Reuse and Waste Reduction	Phase 1
Data Collection	Phase 1
Communication Plan	Phase 1
Sporting Events, Concerts, etc.	Phase 2

Recommendations for Capital University

Sustainability Council. The Council could promote better recycling on campus and help the University move towards food waste recovery by adopting initiatives focused on these topics. The University needs an organization which develops a detailed plan for improving materials management, advocates for more recycling, addresses contamination issues, and develops a food waste recovery program. The Sustainability Council could identify existing groups or organizations on campus which could undertake these tasks, or if suitable groups do not currently exist, encourage the University administration and student government to form such a group. (See the discussion below for "Green Team.") The Sustainability Council could also establish frameworks for linking coursework and course-related student projects with the goals of improving materials management at Capital.

University Website. The University's website should be updated with regard to the Sustainability Council, the importance of sustainability, and the availability of recycling information. The website includes information regarding "Printing on Campus", but there appears to be no other information related to sustainability or recycling.

Green Team. In order to accomplish the objectives discussed above under the Sustainability Council, it is important that the University establish a University Green Team and allow members the necessary time to accomplish their tasks. Also, Universities which have strong recycling and materials management programs

generally have a "hands-on" group of people who are passionate about ensuring that recycling is done properly. This group could be the University Green Team or it could be a separate group that functions under the auspices of the Green Team or under the direction of Facilities Management.[3] (See Appendix I for more information regarding this topic.)

Containers. Contamination is serious issue for the recycling program, and Facility Management staff has acknowledged that better education is needed to minimize this problem. Another recognized need includes consistent labeling of trash and recycling containers, consistent color schemes for containers, and consistent container styles. More containers are also needed throughout campus. Facility Management has indicated that grant funding will be needed to purchase additional containers. Grant money may be available from the Solid Waste Authority of Central Ohio (SWACO) and/or the Ohio EPA. Grant money from Ohio EPA require a 50 percent match from the recipient. (See Appendix J for more information regarding recycling containers.)

Materials Reuse and Waste Reduction. The University Green Team should explore the possibility of implementing an annual event on campus designed for students to swap bags of clothing, books, furniture, and domestic items. This program, which could be expanded to include Bexley residents, could be very successful in promoting reuse and avoiding unnecessary disposal of materials. (See Appendix G for more information regarding this topic.)

Organics. The University should continue to explore options for recovering food waste from the dining hall as well as outdoor events at Capital. Plans developed at Capital should be coordinated with the City's Green Team. Since the University's preferences are collecting the food waste and hauling it off-site to be composted or processed, it is possible that a more advantageous hauling contract could be secured by partnering with Bexley Schools, Columbus School for Girls, and/or restaurants along Main Street.

Early Education. The University should send a clear message to new students as soon as possible about waste reduction, and the importance of sustainability. Move-in weekend for fall semester is an excellent opportunity to begin this process, and the University has already begun discussions exploring ways to expand this type of education for the students.

Interaction with Other Universities. If not already a member, the University, the Sustainability Council, or the University's Green Team should consider subscribing to

[3] Institutions such as Ohio University and University of Oregon have excellent programs largely staffed by students to assist and enhance recycling and reuse efforts on campus. It is possible that Capital University could benefit by contacting one of these programs to learn more about their activities. (See Appendix ___ for more details.)

the "College and University Recycling Coalition" (or CURC). There is no charge for becoming a member of this organization and utilizing the resources offered through its website. The website presents information on recycling and waste reduction programs at university campuses as well as related topics of interest to persons responsible for planning and implementing such programs. For example, webinars are offered for such topics as food waste recovery and recycling bins. The CURC also includes a listserv which can be subscribed to at no charge; subscribers can pose troubleshooting questions to a national group of peers and obtain quality feedback. The website address for the listserv is:

http://www.curc3r.org/resources/recyc-l-listserv

Higher than normal disposal. Move-in day has been discussed above, however, the University should also identify any other time periods when disposal on campus is higher than usual (move-out, before breaks, etc.), Efforts to increase diversion during these periods could be explored. Student volunteers can assist facilities management staff and haulers by coordinating efforts. Volunteers can focus efforts on affected dumpsters/sites, pull out recycling and reusable materials from dumpsters, and help educate students who are improperly disposing of materials. Donation stations should be set up around dorms and in places that are accessible to off-campus students for non-perishable food items, clothing, furniture, and other reusable items.

The University should begin educating students well before "higher than normal disposal periods" (i.e., move-out or breaks), and encourage students to plan ahead in order to take advantage of diversion opportunities. Communication efforts regarding diversion opportunities could include: (1) mass-emails, (2) posters on bulletin boards, (3) Facebook events/social media, and (4) hanging a bag (grocery stores will usually donate these) a week before move out on each occupied dorm door knob with a note attached including instructions. Students would be asked to fill the bag with reusable items they don't plan on taking with them after they move, and a list of locations for depositing the bag when it is full.

The listing of recommendations discussed above which are unique to Capital is included in Table 5-7. The phase when each program will be implemented is also shown in the table.

Table 5-7. Recommendations Unique for Capital University

Recommended Action	Phase for Implementation
Sustainability Council	Phase 1
University Website	Phase 1

Table 5-7. Recommendations Unique for Capital University

Recommended Action	Phase for Implementation
Green Team	Phase 1
Containers	Phase 1
Materials Reuse and Waste Reduction	Phase 1
Organics	Phase 1
Early Education	Phase 1
Interaction with Other Universities	Phase 1
Higher than normal disposal	Phase 1

Recommendations for Columbus School for Girls

Green Team. CSG should consider forming its own Green Team to develop a plan within the school for promoting recycling, food waste recovery, greater environmental education, and pursuing sustainability issues. The Green Team should include faculty, staff, and student representatives, with a liaison to the City's Green Team. The Green Team would not necessarily be responsible implementing every program or project at CSG, but would be instrumental in guiding implementation and ensuring the completion of assigned tasks. (See Appendix I for more information regarding this topic.)

Food Waste Recovery. CSG has already taken steps towards a comprehensive food waste recovery program. To move forward, the Green Team or a separate committee created specifically to address food waste should consider implementing the following tasks:

- Develop a detailed plan for this project which includes a description of each step and a schedule for implementation;
- Conduct additional sampling in the cafeteria to determine the amount of food waste being generated;
- Initiate a pilot project at the school;
- Based upon the experience during the pilot project, revise as necessary, the plan for full-scale food waste recovery.

Several options exist for collecting and processing the food waste, including low-tech composting on-site, in-vessel composting on-site, and hauling off-site to be composted. Each of these alternatives present certain advantages and disadvantages. (Information regarding implementation of a food waste recovery program and the various approaches available for processing can be found in Appendix L.)

Recycling Containers. The school should initiate consistent labeling of trash and recycling containers, consistent color schemes for containers, and consistent container styles. More containers are also needed in certain locations in the building, and should be placed in common locations throughout the building, such as outside all classrooms, or just inside the door of all rooms, or along each hallway. (See Appendix J for more information regarding this topic.)

Curriculum. Zero waste and sustainability projects can provide good opportunities to integrate waste reduction with learning experiences in other areas for students. Zero waste projects require leadership skills, using communication tools effectively, and working with other people. Suggestions and resources for incorporating zero waste planning into school curriculum can be found in Appendix M.

Numerous projects addressing zero waste and recycling can be developed and many websites provide good ideas. One source is Keep America Beautiful (KAB) and their Recycle-Bowl competition. From KAB's website:

> "Recycling is one of the easiest and most effective actions ANYONE can do to protect natural resources, conserve energy, reduce greenhouse gas emissions, and create jobs. Recycling also provides materials that are made into new products. Want to ignite recycling in your school? Friendly competition is a proven way to motivate young people toward adopting sustainable behaviors. Through Recycle-Bowl, we hope to galvanize or improve recycling in elementary, middle and high schools across America."

Details about this program are available at:

https://www.kab.org/recycle-bowl/why-recycle-bowl

The listing of recommendations discussed above which are unique to CSG is included in Table 5-8. The phase when each program will be implemented is also shown in the table.

Table 5-8. Recommendations Unique for CSG

Recommended Action	Phase for Implementation
Green Team	Phase 1
Food Waste Recovery, Pilot Study	Phase 2, Phase 1
Recycling Containers	Phase 1

Table 5-8. Recommendations Unique for CSG

Recommended Action	Phase for Implementation
Curriculum	Phase 1

Recommendations for Bexley Schools

Green Team. Bexley Schools should consider forming its own Green Team to develop a plan within the school for promoting recycling, food waste recovery, greater environmental education, and pursuing sustainability issues. Each building or campus should be represented on the Green Team, and should include faculty, staff, and student representatives. The Green Team should consider appointing a liaison to the City's Green Team as well. The Green Team would not necessarily be responsible implementing every program or project at Bexley Schools, but would be instrumental in guiding implementation and ensuring the completion of assigned tasks. (See Appendix I for more information regarding this topic.)

Food Waste Recovery. The kitchen at Bexley Schools has demonstrated an interest in recovering food waste. As the next step, the School's Green Team or a separate committee created specifically to address food waste should consider implementing the following tasks:

- Develop a detailed plan for this project which includes a description of each step and a schedule for implementation;
- Conduct additional sampling in the cafeteria to determine the amount of food waste being generated;
- Initiate a pilot project at the school;
- Based upon the experience during the pilot project, revise as necessary, the plan for full-scale food waste recovery.

Several options exist for collecting and processing the food waste, including low-tech composting on-site, in-vessel composting on-site, and hauling off-site to be composted. Each of these alternatives present certain advantages and disadvantages. (Information regarding implementation of a food waste recovery program and the various approaches available for processing can be found in Appendix L.)

Recycling Containers. Bexley Schools should initiate consistent labeling of trash and recycling containers, consistent color schemes for containers, and consistent container styles. More containers are also needed in certain locations in the building, and should be placed in common locations throughout the building, such as outside all classrooms, or just inside the door of all rooms, or along each hallway. Recycling containers should

also be paired with the trash containers at the entrance to each building. (See Appendix J for more information regarding this topic.)

Curriculum. See discussion under CSG.

The listing of recommendations discussed above which are unique to Bexley Schools is included in Table 5-9. The phase when each program will be implemented is also shown in the table.

Table 5-9. Recommendations Unique for Bexley Schools

Recommended Action	Phase for Implementation
Green Team	Phase 1
Food Waste Recovery	Phase 2
Recycling Containers	Phase 1
Curriculum	Phase 1

Recommendations for City Special Events and City Property

Establishment of Environmental Sustainability Advisory Council. The creation of the Environmental Sustainability Advisory Council (or ESAC) is discussed in detail under Section 2.

Contracting, Auditing, and Dumpster Service.
The City should consider establishing an auditing program for trash and recyclables collection at all City buildings. The auditing program should include a visual inspection program to monitor the fullness of dumpsters when emptied, contamination levels in recycling containers, and each invoice received from private haulers. This information can be used to assess the appropriateness of current pickup frequencies for trash and recyclables, and determine contracts should be modified.

The City's Green Team should explore joint contracting options with other institutions and/or businesses for collection of trash and recyclables. It is possible that this approach, if available, could result in lower costs for collection. At a minimum, the City should consider soliciting multiple bids for dumpster service.

Construction and Demolition Debris. If not already in place, the City should establish specifications for all construction projects, which require construction and demolition debris to be reused or recycled. Examples of these types of policies are available from political jurisdictions and other institutions throughout the United States.

City Website. The City's website should be updated with regard to the Zero Waste Plan, the importance of sustainability, and the availability of recycling information. Information regarding zero waste plan implementation should be easy to find for those visiting the website.

Recycling Containers. The City should ensure consistent labeling of trash and recycling containers, consistent color schemes for containers, and consistent container styles throughout all City offices and buildings. Additional containers may be needed in certain locations within buildings, and should be placed in common locations throughout each building, such as inside all offices, along each hallway, and in waiting areas for the public. (See Appendix J for more information regarding this topic.)

The City should also explore the possibility of creating a city-wide brand and style for recycling containers. As part of this initiative, the City could investigate options such as making recycling containers available to other institutions through a City program.

The National League of Cities' Sustainable Cities Institute (SCI) provides guidance for a wide range of topics involving materials management, including:

- Conducting a waste characterization study
- Construction and demolition debris management
- Developing and implementing an environmentally-preferable purchasing policy
- Management for electronics and appliances
- Recycling
- Composting
- Waste reduction and diversion

The SCI website can be found at:

http://www.sustainablecitiesinstitute.org/topics/materials-management

Special Events. The City hosts several special events throughout the year, with thousands of residents attending occasions such as the 4th of July Community Celebration. The City should take steps to ensure that both trash and recycling containers are available at each event, and explore the possibility of also collecting organic waste if food is served. The City should also use the opportunity of these events to educate residents with regard to the Zero Waste Plan and sustainability issues in general by hosting a booth, handing out brochures, etc. (See Section 6 for additional details on education.)

Purchasing Recycled-Content Products. If the City does not currently have a policy addressing the purchase of recycled-content products, or environmentally-sustainable products, one should be developed and adopted. Many organizations have such a policy which helps to ensure that the purchase of products is in keeping with the goals of sustainability and also promotes the markets of recycled-content products. The policy should include the purchase of materials for all new construction and renovation at the institution. (See Appendix D for more information regarding this topic.)

Table 5-10. Recommendations City of Bexley

Recommended Action	Phase for Implementation
Create Environmental Sustainability Advisory Council	Phase 1
Contracting, Auditing, and Dumpster Service	Phase 2
Construction and Demolition Debris - sustainable policy	Phase 2
City Website - add more information for ZWP, and make it easier to find	Phase 1
Recycling Containers - more containers, consistent labeling, styles, color, community-wide initiative, etc.	Phase 1
Special Events - ensure availability of recycling, education	Phase 1
Purchasing Recycled-Content Products - establish (or review) policy	Phase 2

SECTION 6 – EDUCATION AND PROMOTION OF THE ZWP

The City of Bexley is striving to become the first Zero Waste community in Franklin County. The City established a diversion goal of 90 percent by 2040, but recognizes that education is an important part of implementing a Zero Waste Plan (ZWP). The community needs to be educated and enthusiastic for the City to meet the ZWP goals and reach its target. The following objectives for education and outreach were developed by the Green Team.

- Objective 6-1-2017 – Develop an education and outreach plan for each target audience (residents, commercial businesses, institutions, etc.).
- Objective 6-2-2017 – Develop Bexley Zero Waste content for Facebook and/or City website page.
- Objective 6-3-2017 – Prepare topical videos and posts which focus on sustainable practices, or borrow content from public/private resources (i.e., SWACO, Rumpke). Topics for videos and posts could include backyard composting, recycling, providing re-useable materials to Habitat Restore, etc. Distribution of the videos and posts would take place through social media.
- Objective 6-4-2017 – Develop and promote a web-based directory of local reuse and recycling options for all types of materials.

Appendix C has been prepared to help the Green Team Education and Outreach Committee with the development of a plan and ideas for implementation.

I. Education and Outreach Plan

The Green Team indicated early in the ZWP development that education and outreach is critical if the programming and recommendations are to be successful. Following the adoption of the ZWP by Bexley City Council, the Green Team should establish an Education and Outreach Planning Subcommittee. The Subcommittee should have three to five members and would be responsible for evaluating this section of the plan and creating a budget and three-year implementation plan for the priority programs identified in Phase 1.

The Education and Outreach Plan includes the following sections.

- Community Participation with ZWP Development
- Education and Information at Bexley Events
- Education and Outreach for Residents
- Education and Outreach for Commercial and Industrial Facilities
- Education and Outreach for Institutions
- Bexley Zero Waste Content for Social Media

- Video and Outreach Materials
- Web Based Directory
- Schedule of Implementation

The Education and Outreach plan details will be identified and prepared by the Subcommittee. The initial focus should be on the priority programs identified by the Green Team for Phase 1.

A. Community Participation with ZWP Development

The Green Team should develop a formal schedule to present the ZWP and accept comments from the community. The Green Team should host two meetings that will present details of the development of the ZWP and the recommendations for public comment. Meetings should be held in early summer to get feedback on potential programs and the draft final document at the end of the summer before implemented in 2018. The public will be invited to share comments, suggestions, and concerns. The goal is to publicize the ZWP and foster positive feedback from the community. These meetings will be added to the City Calendar to inform the Bexley community. Social media may also be used to promote the meetings to encourage a high turnout for the discussion.

Implementation Activities:

- Host a subcommittee meeting to define roles
- Create agenda and presentation for the meetings
- Create an invitation for the community calendar
- Establish who will facilitate the meeting
- Determine who will make presentations
- Identify location for the meeting

B. Education and Information at Bexley Events

Public encouragement towards a zero waste community can happen anywhere. Visuals for drive and walk-bys are a great start. Wherever public events are advertised, a message to support the ZWP can be added. Educational signs could be created for recreational parks, the community center and/or the pool. The goal for signs is to have ZWP branded, with concise content for high traffic areas in Bexley.

Special events held in the City of Bexley are a great place to inform and talk to members of the community. Signs and pamphlets can be passed out to encourage participation in ZWP recommended programs. Green Team members may consider the following Bexley events to publicize the ZWP and its goals:

- Greater Bexley Community Cleanup – Earth day
- July 4th parade
- Bexley Day founded 1908 – August 10th
- Labor Day Block Party – September
- Harvest Festival – October
- Annual Pancake Breakfast – December

Implementation Activities:

The Green Team education and outreach subcommittee should meet with each planning group for the Bexley activities to implement the following:

- A booth or table of information about the Bexley ZWP.
- Develop or collect brochures/pamphlets to provide at each event about recycling and waste reduction including Rumpke residential recycling opportunities. The subcommittee can obtain brochures and information from Ohio EPA, SWACO, Mid-Oho Regional Planning, and Ohio Solid Waste Districts.
- All materials to inform and educate residents about Bexley events should be branded and can also identify the link to the ZWP at the Bexley website.

C. Education and Outreach for Residents

Once the programming and plans for the residential sector are determined, the Green Team Education and Outreach Subcommittee should develop a specific plan for informing residents about new programming. For example, if a volume-based system is selected for trash collection, the subcommittee should develop a schedule that the City will follow to inform residents about any new programming. This may include the City website and social media sites. The messages used for all types of media should be the same and use ZWP branding. Additionally, any

contract with private haulers should also require multiple mailings to residents each year of the program.
The City can post statistics on the success of the program on a monthly basis on the website. Similarly, the subcommittee should develop plans for the other Phase 1 residential programs.

Many residents prefer paper copies of notices. The Subcommittee should work with local media to have articles posted in the local suburban newspaper.

Implementation Plan

- Ensure that residents receive regular mailings on acceptable materials in recycling program.
- Brand the information and include it on Bexley website and social media.
- Host meetings on backyard composting through SWACO or soil and water conservation.
- Coordinate meetings with businesses and residents regarding the elimination of plastic bags.
- Educate residents through social media and the website on where to take old electronics, HHW and textiles.
- Educate residents about food waste pilot program including.

D. Education and Outreach for Commercial and Industrial Businesses

The City of Bexley Green Team and the Education and Outreach Subcommittee may provide businesses that recycle materials a sign with an emblem of Bexley that advertises to the public that this business recycles. Bexley could also provide businesses with a list of haulers providing recycling services that can be easily accessed from the City's Web-based Directory.

Implementation Plan

- Develop stickers to be used for participating businesses.
- Conduct annual survey of businesses to obtain recycling information.
- Invite business owners to a ZWP meeting to share goals and objectives for the business community.

E. Education and Outreach for Institutions

The City of Bexley accommodates three educational institutions, the Bexley City Schools, Columbus School for Girls, and Capital University. The Green Team should explore options to stimulate interest in students, faculty, and staff about the Zero Waste Plan.

The Green Team Education and Outreach Subcommittee should work with the Bexley City Schools to schedule professionals from the Solid Waste Authority of Central Ohio (SWACO) to educate students or hold teacher workshops on waste disposal, reuse, minimization, and recycling. The Green Team Subcommittee can also promote increased recycling efforts with the Columbus School for Girls. There are also opportunities for students to tour the landfill.

The Education and Outreach Subcommittee should meet with Capital University Sustainability Council. The purpose of the meetings would be to assist Capital in developing a ZWP for the campus. This would include creating signs and other educational pieces for the campus awareness. Emails and bulletin boards signs are a great way to reach the student population as a recycling reminder before and during higher disposal activities (e.g., move-in, move-out, before breaks, etc.). Messages must be branded and consistent with the principles developed in the University's own Zero Waste Plan.

Implementation Plan

- Initiate meetings with Capital University Sustainability Council and explore areas of mutual cooperation and interest including food waste composting with Bexley Schools and Columbus School for Girls.
- Ensure cooperation between SWACO, the City and schools for educational opportunities for students including summer camps.
- Review recycling statistics with the institutions and ensure data is collected annually.

F. Bexley Zero Waste Content for Social Media

The City of Bexley Green Team Education and Outreach Subcommittee will be responsible for coordinating with the City's IT person and webmaster. Online resources are an efficient and fast way to get information out to the community. It is important to keep information updated and easily accessible. There are many

types of social media to promote and educate the community. The City's website, Email communicator, City Calendar, and social media are a few.

Through the website, residents can review the City Calendar for ZWP meetings and activities coming up in their community. Residents have the option to subscribe to this calendar, as well as, the email communicator, the "Bexley Blast."

The City uses three forms of social media, Facebook, Twitter, and Pinterest, with Facebook as their most frequently used for announcements and information distribution. Facebook has easy to use features to link websites, articles, and videos to the newsfeed. For programmatic changes, it is important to structure and schedule information posts as appropriate to educate residents and businesses such as the ZWP implementation and the possible PAYT program. The Green Team should consider the following schedule to structure their Facebook posts to meet purposes of awareness, persuasion, and implementation of the ZWP:

Implementation Schedule

- August-September: Awareness plan with minimal (posts to inform the community about the ZWP and its goals).
- October-November: Information on program priorities and the first programs to be implemented through the ZWP.
- December: What is coming in 2018 and how residents will receive more information about programming.
- Other activities can include Twitter to spread recycling awareness and advertise venues where the Green Team will be located. Pinterest is a great tool to share information from Bexley's website and recycling "How-To's" and "Did You Know?".

G. Video and Outreach Materials

The City of Bexley Green Team should use material which focuses on sustainable practices. Material that would benefit the community include videos and posts of backyard composting, recycling, providing re-useable materials to Habitat Restore, etc. The Team may reach out and borrow content from public/private resources (i.e., SWACO, Rumpke, etc.) to further ensure accurate and professional material is reaching their community. Distribution methods of these videos and posts may include posts on social media and on the City's website.

H. Web-based Directory

The City's Recycle page, http://www.bexley.org/recycle, is an excellent place for the community to learn about what they can and cannot recycle. The Green Team should create a web-based directory of local reuse and recycling options for all types of materials. This can include local second-hand clothing shops, community back-yard composting, and reusable items that can be sent to places such as Habitat Restore. This directory will be a resource for education and promotion of the reuse, reduce, and recycle initiative in their local community to support the ZWP goals. The goal of the directory is to list items that can be recycled and suggest how to or where to take these items.

The City website should include a list of local recycle haulers for the commercial sector. The Green Team should encourage commercial companies who do not recycle to evaluate how to get recycle collection started. The Green Team subcommittee will include contact information and web links to the City IT manager to list this information.

Additionally, a map of a 2-mile radius of drop-off recycle locations should be placed on the website for areas that will not have access to the Bexley's recycling programs (e.g., multi-family apartments). Bexley does not have drop-off recycling available in the Bexley City limits, but the community is encouraged to recycle rather than send recyclable material as waste to the landfill.

I. Implementation Plan for Outreach Materials and Web Directory

- Develop list of haulers to place on the website for commercial waste. SWACO should be able to assist.
- Establish links on City website to programs on how to start a recycling program at your business.
- Develop a directory of locations for specialized recycled materials.

Recommended Schedule of Implementation

A summary of suggested actions for the Bexley Green Team to perform in order to effectively proceed with the ZWP outreach program. Further details about the implementation schedule can be found in Appendix C.

Recommended Action	Phase for Implementation
Establish an Education and Outreach Planning Subcommittee.	Phase 1
Develop a formal schedule to present the ZWP to the community.	Phase 1
Create educational signs to brand ZWP for high traffic areas in Bexley.	Phase 2
Develop a specific plan for informing residents about new programming.	Phase 1
Provide businesses that recycle materials a sign with an emblem of Bexley that advertises to the public that this business recycles.	Phase 2
Work with the Bexley City Schools to schedule professionals from the SWACO to come in to educate students, faculty, and staff.	Phase 1
Meet with Capital University Sustainability Council to establish data needs and working relationship with City.	Phase 1
Coordinate with the City's IT person and webmaster for social media material.	Phase 1
Create a web-based directory of local reuse and recycling options for all types of materials.	Phase 1
Create a list of local recycle haulers for the commercial sector and communicate information and web links to the City IT manager to list this information.	Phase 1
Map out drop-off recycle locations within a 2-mile radius of Bexley.	Phase 1

SECTION 7 – MOVING TOWARD ZERO WASTE

Each of the sections of the ZWP covered specific topics and sectors of waste management. Specifically, Section 2 included the development of a Mission, Goals and Objectives for the ZWP. Section 3 focuses on residential waste. Section 4 reviews opportunities for commercial businesses. Section 5 reviews the programs at some of the institutions in the community and Section 6 focuses on education of Bexley residents and businesses.

At the end of the sections, the Green Team evaluated proposed recommendations. The recommendations were classified as either a Phase 1, 2, or 3 task or program. Each Phase has a specific time frame. For example, a Phase 1 task or program is to be completed between 2018 and 2023. Phase 2 continues from 2024 to 2030 and Phase 3 is 2031 through 2040.

At the completion of Sections 3, 4, 5 and 6, the Green Team had recommended 58 tasks or programs for Phase 1 implementation. Recognizing that it would be extremely difficult to implement all of these recommendations in the first six years of plan implementation, the Green Team voted individually for their top ten recommendations of the Phase 1 initiatives. After the vote was tallied, it was determined that twenty initiatives were appropriate for the initial Phase and were prioritized. Many of the initiatives had similar themes and were combined either by a sector or topic and presented here as the initial priorities for Phase 1.

Phase 1

As discussed in Section 2 of this Plan, recommendations include creation and adoption of an Environmental Sustainability Advisory Council (or ESAC) by the City Council. While the ESAC will have the responsibility of overseeing implementation of the ZWP, it is recommended that the ESAC form subcommittees to undertake the necessary research, investigation, and analysis which will be required to implement many of the programs and strategies in Phase 1 and Phase 2. Subcommittees should also be considered for the responsibility of monitoring program success and suggesting modifications for improvement.

Priority 1 – Education

Since its initial meetings, the Green Team recommended a focus on education. The following initiatives for education are a top priority for Phase 1.

a. Establish an Education and Outreach Subcommittee of the Green Team or ESAC.

b. Develop a formal schedule to present the ZWP to the community (includes hosting public meetings and receiving comments from residents, businesses and institutions). It is recommended that the Green Team invite entities that are

impacted by proposed programs to Green Team meetings to learn the impact changes in behavior and processing of materials would have on businesses.

c. Develop a specific plan for informing residents about new programming (i.e., new programs and changes to existing programs need to be efficiently and effectively communicated to residents, businesses and institutions on a timely basis).

d. Develop and implement an education program to emphasize the existing collection opportunities for HHW, electronics, and textiles.

e. Increase data collection and issue plan to complete studies (i.e., develop a plan to improve and expand data collection, and data analysis). This program is critically important in order to measure the success of individual programs, identify changes which may be needed to improve programs, and assess the overall progress of ZWP implementation towards achieving the diversion goal.

f. "Plastics Recycling: Promote education and development of greater plastics recycling."

g. "Reuse and Source Reduction: Expand reuse and source reduction of waste materials within businesses (e.g., improve education and outreach to businesses regarding opportunities to reduce waste and donate materials for reuse)"

h. City Website – add more information for ZWP, and make the information easier to find.

Implementation of Priority 1. Each of the programs listed above for Priority 1 have been included below in Table 7-1 with a suggested time frame (or start date) for implementation. The need for many of these programs will continue indefinitely beyond the suggested start date. However, programs "a" and "b" only require initial input in 2017 with no further tasks. Table 7-1 also includes suggestions which address the responsibility for implementing each of the programs. For example, it is recommended that the ESAC create a Data Collection & Analysis Subcommittee to implement program "e", increasing data collection and data analysis, etc. (Appendix C of the ZWP includes many suggestions and ideas for education programs.)

Table 7-1. Priority 1 Programs in Phase 1

Program	Implementation	
	Suggested Start Date	Responsibility
Priority 1 - Education		
a. Establish an Education and Outreach Subcommittee	2017	ESAC
b. Develop a formal schedule to present the ZWP to the community	2017	Green Team
c. Develop a specific plan for informing residents about new programming	2017	Education and Outreach Subcommittee
d. Emphasize existing collection opportunities for HHW, electronics, and textiles	2018	Education and Outreach Subcommittee
e. Increase data collection, etc.	2018	Data Collection & Analysis Subcommittee
f. Promote greater plastics recycling	2018	Plastics Recycling Subcommittee
g. Expand reuse and source reduction of waste materials within businesses	2018	Reuse, Reduction, & Recycling Subcommittee

Costs for Priority 1. The cost to implement the education initiatives should be presented as a budget annually by the Education and Outreach Subcommittee to the ESAC, and ultimately to City Council. Estimated costs for implementation of these educational programs should be minimal.

Priority 2: Programs for the Residential Sector

The Green Team identified several residential sector initiatives as top priorities:

a. The existing collection contract for the City should be reviewed and the following changes should be explored. The use of a pay-as-you-throw (PAYT) program for trash and recyclables collection; semi-automatic or fully-automatic collection.

b. Investigate the options available for reducing the use of plastic bags, which could involve meetings with local businesses, obtaining information from SWACO regarding the plastic bag recycling pilot program, obtaining more details from other communities about the implementation of local plastic bag

bans. The results of these efforts should determine the next steps that Bexley will take with regard to the use of plastic bags.

c. Expand the use of carts to all single-family dwellings.

d. Pursue the design and development of a food waste collection pilot program, with the intent of offering food waste collection for all residents and businesses. (This program could be combined with the food waste program for the commercial sector.)

e. Provide a City of Bexley electronics drop-off. Details regarding SWACO's E-waste collection program for communities such as Bexley can be found in Appendix F and at:

http://oh-swaco.civicplus.com/187/E-Waste-Diversion-Program

f. Eliminate backdoor service (potentially to reduce collection costs and provide easier implementation of semi-automatic and fully-automatic collection options)

Implementation of Priority 2. Table 7-2 lists each of the Priority 2 programs, and includes the suggested implementation dates as well as the entity responsible for implementation. Although programs "a" and "c" involve different aspects of collection, it is recommended that implementation of these programs is coordinated. Each program in Priority 2 will require substantial investigation and analysis, and may require several years to complete implementation. For example, expanding the use of carts to all single-family dwellings will involve obtaining bids for the carts, developing and implementing an education program for the residents who will receive the carts, determining if the City will subsidize the cost of the carts for residents, and most likely re-negotiating the contract to address the change in collection. Table 7-2 shows that planning for the expansion of the use of carts will begin in 2018, with all residents receiving carts in 2020.

Table 7-2. Priority 2 Programs in Phase 1

Program	Implementation	
	Suggested Start Date	Responsibility
Priority 2 - Residential Sector		
a. Review existing collection contract for the City; explore PAYT	2018 through 2020	Trash & Recyclables Collection Subcommittee

Table 7-2. Priority 2 Programs in Phase 1

Program	Implementation	
	Suggested Start Date	Responsibility
b. Investigate the options available for reducing the use of plastic bags, etc.	2018	Plastics Recycling Subcommittee
c. Expand the use of carts to all single-family dwellings	2018 through 2020	Trash & Recyclables Collection Subcommittee
d. Design and develop a food waste collection pilot program, etc.	Begin in 2018	Organic Waste Subcommittee
e. Provide a City of Bexley electronics drop-off	2018	Education and Outreach Subcommittee

Costs for Priority 2. The cost of implementing programs "b" and "e" should be minimal, as the City may choose to utilize existing SWACO programs to achieve the goals of these programs. The City should contact SWACO regarding establishment and costs of an electronics drop-off.

The costs for the remaining programs selected for implementation in Priority 2 are difficult to determine without additional planning, and the solicitation of bids for required services. The purchase of carts for program "c" will be a significant expense, and estimated at $420,000 assuming a bid price of $60 per cart. (The cost estimate includes the purchase of 3,570 trash carts and 3,430 recycling carts.) It is possible that the re-negotiation of the City's collection contract could result in lower costs, since the switch to carts for all residents would allow the contractor to use automated or semi-automated collection.

Implementation of program "d" should be coordinated with both program "a" and program "c". The City should consider the option of combining the collection of food waste with yard waste (as many communities across the United States have done), which would involve changes to the existing collection contract. Many communities in the U.S. have also implemented a PAYT program as part of their organic waste collection.

Priority 3: Programs for the Commercial Sector

The Green Team identified three commercial sector initiatives as top priorities:

a. Trash and Recycling Containers. The City should develop a policy for the pairing of trash and recycling containers, ensuring appropriate number of containers, consistent colors, styles, and sizes of containers. The City should then encourage businesses to adopt the policy or guidelines.

b. Mandatory Recycling, Exclusive Hauler Arrangements, and Licensing. Form a stakeholder group to begin discussions addressing these topics, including representatives from the business community, haulers, community leaders, and SWACO.

c. Food Waste Programs. Develop a short and long-term business plan for the commercial and industrial sectors to address food waste recovery in various types of businesses, including the collection and transportation of food waste. (This program could be combined with the food waste pilot program in the residential sector.)

Implementation of Priority 3. Table 7-3 summarizes the programs selected in the commercial sector, and includes the suggested implementation start dates and the subcommittee responsible for implementation. It is likely that the policy or guidelines for trash and recycling containers (program "a") can be developed during 2018. Encouraging businesses to adopt the policy will be an ongoing effort.

Table 7-3. Priority 3 Programs in Phase 1

Program	Implementation	
	Suggested Start Date	Responsibility
Priority 3 - Commercial Sector		
a. Development of a policy for the pairing of trash and recycling containers, etc. Encourage adoption by businesses	2018	Trash & Recyclables Collection Subcommittee
b. Mandatory Recycling, Exclusive Hauler Arrangements, and Licensing. Form a stakeholder group to begin discussions	Begin in 2018	Commercial Collection Subcommittee
c. Food Waste Recovery. Develop a short and long-term business plan for the commercial and industrial sectors	Begin in 2018	Organic Waste Subcommittee

Programs "b" and "c" are likely to be long-term projects which may not be completed during 2018. Forming a stakeholder group under program "b" is one of

the first of a series of steps toward implementing mandatory recycling, exclusive hauler arrangements, and/or licensing, in an effort to increase waste diversion in the commercial sector. The other steps in this process are included in Phase 2 recommendations.

The program "c" is also likely to be a longer-term project, with several additional tasks associated with commercial sector food waste recovery which are recommended in Phase 2. The ESAC should consider coordinating this program with the food waste pilot project for the residential sector in Priority 2.

Costs for Priority 3. The costs for providing all offices, hallways, waiting areas, building entrances, and outside areas with trash and recycling containers, which is the ultimate goal of program "a", can be quite substantial for large businesses and institutions. Table 7-4 shows a range of types of recycling containers designed for various locations within businesses and institutions. Table 7-4 shows the estimated retail costs for containers, however, it is likely that reduced costs could be negotiated with a vendor through a bulk purchasing contract. It is possible that the City could secure SWACO community grants, Ohio EPA grants

Table 7-4. Types of Containers

Type of Recycling Container	Image	Expected Use	Unit Price
Plastic deskside bin		at workstations; for primarily paper	$5 to $10
Slim Jim		at copiers; for paper	$53
Waste Watcher		in break rooms, kitchens	$81
ErgoCan Trash and Recycling Containers		in conference rooms, public reception areas; for trash and all recyclables	$279
Glaro 2-Stream Trash and Recycling Containers		in conference rooms and public areas where more attractive containers are desired	$362

Table 7-4. Types of Containers

Type of Recycling Container	Image	Expected Use	Unit Price
Outdoor Manchester Sideload Double Recycling Station		at outdoor entrances to buildings with need for attractive containers	$1,445
Outdoor Expanded Metal Waste & Recycle Combo		less expensive alternative for outdoor entrances to buildings	$381

The costs for implementing programs "b" and "c" should be minimal. However, the City may determine the need to hire assistance to provide leadership and expertise to complete the tasks.

Priority 4: Program for the Institutional Sector

The following program was selected for implementation during Phase 1 for the institutional sector:

a. Capital University, Columbus School for Girls, Bexley Schools, St. Charles, Trinity Lutheran Seminary, Bexley Library and others: Contracting, Auditing, and Dumpster Service (includes regular monitoring of trash and recycling dumpsters, evaluation of invoices from service providers, obtaining multiple bids for service, and exploring joint bids among the institutions and possibly the City)

Implementation of Priority 4. The one program selected for the institutional sector during Phase 1 is recommended to begin during the last four to five months of 2017. (See Table 7-5.) The intent of this program involves three separate activities for trash and recyclables collection at each institution:

- Assign one or more individuals to monitor the dumpsters regularly;
- Initiate an auditing process to systematically evaluate invoices for contracted collection services; and
- Obtain multiple bids for services, and explore the possibility of joint bids with other institutions, the City, and/or businesses.

(Greater details regarding each of these activities are described in Section 5 of this plan.)

The ultimate responsibility for implementing this program rests with each of the institutions. However, it is recommended that the Trash & Recyclables Collection Subcommittee provide guidance and assistance to the institutions, and initiate the scheduling of periodic meetings.

Table 7-5. Priority 4 Programs in Phase 1

Program	Implementation	
	Suggested Start Date	Responsibility
Priority 4 - Institutional Sector		
a. Capital University, Columbus School for Girls, Bexley Schools, St. Charles, Trinity Lutheran Seminary, Bexley Library and others. Contracting, Auditing, and Dumpster Service	Begin in late 2017	Trash & Recyclables Collection Subcommittee

Costs for Priority 4. The institutions should actually save money through the implementation of this program. It will require the time of at least two or three individuals at each institution to monitor the dumpsters and contracts, and audit the invoices, but has the potential to lower service costs for collection.

Priority 5: City of Bexley

The following program was selected for implementation during Phase 1 for the City:

- Recycling Containers - more containers, consistent labeling, styles, color, community-wide initiative, etc. (i.e., the City should develop guidelines to ensure consistent labeling, styles, and color for all recycling and trash containers inside buildings, and explore the possibility of promoting or establishing these guidelines throughout the City in businesses and institutions. The adequacy of the number of recycling containers should also be assesses in each City building and office.)
- Special Events - ensure availability of adequate recycling at each event, and provide ZWP education for residents at each event.

Implementation of Priority 5. Table 7-6 shows the suggested start dates for the programs in Priority 5, and the subcommittees recommended to lead implementation efforts. The results of program "a" to develop a policy or guidelines for trash and recycling containers will also allow implementation of the first program listed for the commercial sector in Table 7-3.

The City could pursue a wide range of possibilities for implementing this program. One approach could involve developing the guidelines, making the necessary purchases for City buildings and special events to implement the guidelines, and then promoting the guidelines throughout the City. A much broader approach would require the City to develop the guidelines, secure "buy-in" from institutions and businesses within the City[1], and then make a bulk purchase of trash and recycling containers for City buildings, institutions, and businesses. The City would then "sell" containers to institutions and businesses.

Table 7-6. Priority 5 Programs in Phase 1

Program	Implementation	
	Suggested Start Date	Responsibility
Priority 5 - City of Bexley		
a. Recycling Containers - more containers, consistent labeling, styles, color, community-wide initiative, etc.	2018	Trash & Recyclables Collection Subcommittee
b. Special Events - ensure availability of adequate recycling at each event, etc.	Begin in 2018	Education and Outreach Subcommittee

Costs for Priority 5. The initial costs to implement these programs for the City should be minimal. However, as discussed above for the commercial sector, the costs for trash and recycling containers can be substantial. It is possible that the City could obtain grants from SWACO through the Community Waste Reduction Grant program (see http://www.swaco.org/189/Community-Waste-Reduction) and/or Ohio EPA. The Ohio Water Development Authority (OWDA) may also be a source of funding through a low-interest loan.

[1] Securing "buy-in" from businesses and institutions would likely require a number of meetings, and a commitment from the participants (through perhaps a memorandum of understanding) to follow the guidelines for this program, and the number of containers needed.

Moving the Zero Waste Needle

The five Phase 1 priorities are designed to get the City moving down the Road to Zero Waste. The priorities, if implemented, will likely initiate improvement and diversion from landfill disposal which is the Mission of the City for this ZWP. (See Mission Statement in text box to the right.)

> ***City of Bexley Mission Statement***
>
> *The Bexley community will significantly reduce its contribution to the landfill through sustainable environmental initiatives for residents, businesses, institutions, and industries by improving public engagement, education, and infrastructure.*

It is difficult to predict the tons of diversion which will occur from the implementation of Phase 1 programs, in part due to the lack of data for the commercial sector. Nevertheless, Table 7-7 provides rough estimates for diversion tonnages and percentages through year 2023 based upon several assumptions which are discussed below. It is assumed that the effects of Phase 1 programs will not be observed until year 2018 since implementation will not initiate until the end of 2017 or during 2018. The assumptions associated with calculating the tonnages for each column in Table 7-7 are explained below.

Table 7-7. Diversion Projections Resulting from Phase 1 Programs

Year	Disposal (1%/yr. decrease)	Total Recycling	Yard Waste	Total Generation	Diversion Rate	Reuse/Source Reduction
2015	11,092	3,448	1,259	15,800	29.8%	0
2016	11,092	3,448	1,259	15,800	29.8%	0
2017	11,092	3,448	1,259	15,800	29.8%	0
2018	10,982	3,448	1,289	15,718	30.1%	111
2019	10,872	3,489	1,318	15,678	30.7%	110
2020	10,763	3,580	1,348	15,690	31.4%	109
2021	10,655	3,728	1,377	15,761	32.4%	108
2022	10,549	3,877	1,389	15,815	33.3%	107
2023	10,443	4,027	1,554	16,025	34.8%	105

- ***Disposal.*** Phase 1 includes an education program to expand reuse and source reduction of waste materials within businesses. Greater reuse and source reduction in the commercial sector (and also the residential and institutional sectors) will be critical in order to reach the ZWP diversion goal since many

materials in the waste stream cannot be recycled or are very difficult to recycle. To be conservative and to recognize the difficulty in achieving more reuse and source reduction, the projections in Table 7-7 assume that disposal will be reduced from the 2015 total by one percent per year through 2023.

- ***Total Recycling.*** Several programs in Phase 1 should increase recycling in the residential and commercial sectors. Educational efforts and development and implementation of a guidelines for trash and recycling containers should lead to greater recycling. For the commercial sector, it is assumed that these programs will increase recycling by two percent per year. In the residential sector, it is assumed that the use of carts for all residents (and possibly the implementation of a PAYT collection system) will increase the recovery of recyclables from 626 pounds/household/year to 800 pounds/household/year.
- ***Yard Waste.*** It is assumed that yard waste recovery from the residential sector will remain constant at the 2015 tonnage. For the commercial and institutional sectors, it is assumed that educational efforts will result in 50 percent of the calculated yard waste remaining in the waste stream from these sectors will be recovered by year 2023.

The result of these programs in Phase 1 is expected to increase the overall diversion rate to approximately 35 percent. If the residential sector for single-family homes is considered separately, the diversion rate is expected to increase from 39 percent to 42 percent.[2]

Phase 2

Moving the needle or diversion rate beyond 35 percent will require implementation of the Phase 2 initiatives, and could require new processing technology down the road that is not even contemplated today. Consequently, the goal to attain a 90 percent reduction from today is scheduled for 2040. The ESAC will need to establish priorities and implementation dates for Phase 2 based upon the availability of better data, conducting detailed pro forma analyses for proposed programs, and estimating up-to-date costs and their impacts on the residents, businesses, and institutions.[3] Some programs may need to wait until better economics and technology are available, while others will likely be able to move forward and help move the zero waste needle toward the 90% reduction goals early-on during Phase 2. As an example, adequate infrastructure for managing certain materials that are difficult to reduce, reuse or recycle such as mattresses, carpeting and types of plastics may be needed before moving ahead with a diversion program.

[2] Recycling in multi-family housing units is not available, so the diversion rate for this population was calculated by assuming a recycling rate per household similar to existing drop-off recycling programs.
[3] It is also strongly recommended that the City employ the same procedures for analysis of Phase 1 programs, revisit priorities and implementation dates, and determine if adjustments are warranted for the ZWP.

The goal of all the initiatives and priorities presented is to develop programs and technology that can keep the economic impact for residents, businesses, and institutions on a cost-neutral basis. However, this goal will be a challenge, especially as the City implements programs requiring the collection of materials such as food waste, and addresses recyclables and food waste collection for businesses which have limited space available for carts and/or dumpsters. Providing a vehicle to collect heavy and wet food waste, glass, and other hard to recycle materials can be costly. However, substantial volumes of these materials combined from all generators will help to keep costs low on a per ton basis.

Table 7-8 lists all of the programs not selected for implementation during Phase 1. The ESAC should identify all the Phase 2 programs which will not (or are unlikely to) require substantial analysis and investigation prior to implementation. Examples of such programs could be encouraging back yard composting, establishing reuse and recycling specifications for all construction projects, and coordinating with the City's IT department and webmaster for posting of social media material pertaining to ZWP subject matter. Next, the ESAC should consider combining individual recommendations under a single topic which are similar. For instance, Phase 2 recommendations include four separate strategies for food waste recovery in the commercial sector. These strategies could be combined under one program called "Food Waste." After combining recommendations, the ESAC should consider establishing subcommittees (as described under Phase 1) which will responsible moving the City towards implementation, and monitoring implementation.

Table 7-8. Phase 2 Programs

Phase Two - Residential Sector	
Back yard composting should be encouraged for Bexley residents through an improved educational program which could include a "master gardener" program to teach residents about the benefits of using compost for improving soil structure, water-holding capacity, and organic matter content.	Explore the development of a waste consortium or franchising agreement which would include MFH units for the collection of trash and recyclables. The City should also follow SWACO's progress towards addressing this issue, and take advantage of any improvements or programs offered by SWACO.
For residents not interested in back yard composting, implement education program encouraging them to participate in yard waste collection at the curb.	SWACO to address hard-to-recycle materials including but not limited to plastics 3-7
Explore the possibility of partnering with other communities in Franklin County for a textile collection program using a company such as Simple Recycling.	

Table 7-8. Phase 2 Programs

Phase Two - Commercial Sector	
Establishment of Green Teams: Form green teams within each commercial and industrial business	Waste Audits: Conduct general business-specific waste audits.
Mandatory Recycling, Exclusive Hauler Arrangements, and Licensing 1. Gather more information (e.g., in-depth literature review, conduct interviews, etc.)	Food Waste Programs: 2. Conduct an inventory of businesses to be targeted by the food waste program.
Mandatory Recycling, Exclusive Hauler Arrangements, and Licensing 2. Develop a business plan with tasks to be accomplished and an implementation schedule.	Food Waste Programs: 3. Conduct selected waste audits at one or more targeted businesses.
Mandatory Recycling, Exclusive Hauler Arrangements, and Licensing 4. Implement mandatory recycling program for commercial/industrial sector with requirements for waste haulers.	Food Waste Programs: 4. Implement a pilot project for food waste collection.
Special Wastes, including Electronics: Implement special waste recycling and reuse programs to manage these types of materials effectively.	Food Waste Programs: 5. Revise long-term plan, if necessary, based upon pilot project results, and implement long-term plan.
Contracting, Auditing, and Dumpster Service: City's green team (or ESAC) work with businesses to improve these elements of waste management.	Construction and Demolition Debris: Establish specifications for all construction projects which require construction and demolition debris to be reused or recycled.
Communication plan within each business: Develop communication plan as part of Education Program targeted at business owners and waste management programs	Purchasing Recycled-Content Products: Adopt policies promoting purchase of recycled-content, or environmentally-sustainable products.
Phase Two - Institutional Sector	
Common to Capital University, CSG, and Bexley Schools: Purchasing Recycled-Content Products	Common to Capital University, CSG, and Bexley Schools: Reuse and Waste Reduction

Table 7-8. Phase 2 Programs

Common to Capital University, CSG, and Bexley Schools: Waste Sorts	Common to Capital University, CSG, and Bexley Schools: Data Collection
Common to Capital University, CSG, and Bexley Schools: Construction and Demolition Debris	Common to Capital University, CSG, and Bexley Schools: Communication Plan
Common to Capital University, CSG, and Bexley Schools: Special Wastes	Common to Capital University, CSG, and Bexley Schools: Sporting Events, Concerts, etc.
Capital University: Sustainability Council	CSG: Green Team
Capital University: University Website	CSG: Food Waste Recovery
Capital University: Green Team	CSG: Pilot Study, food waste
Capital University: Containers	CSG: Recycling Containers
Capital University: Materials Reuse and Waste Reduction	CSG: Curriculum
Capital University: Organics	Bexley Schools: Green Team
Capital University: Early Education	Bexley Schools: Food Waste Recovery
Capital University: Interaction with Other Universities	Bexley Schools: Recycling Containers
Capital University: Higher than normal disposal	Bexley Schools: Curriculum
Phase Two - City	
Create Environmental Sustainability Advisory Council	Construction and Demolition Debris - sustainable policy
Contracting, Auditing, and Dumpster Service	Purchasing Recycled-Content Products - establish (or review) policy
Phase Two - Education and Promotion	
Create educational signs to brand ZWP for high traffic areas in Bexley.	Coordinate with the City's IT person and webmaster for social media material.
Provide businesses that recycle materials a sign with an emblem of Bexley that advertises to the public that this business recycles.	Create a web-based directory of local reuse and recycling options for all types of materials.

Table 7-8. Phase 2 Programs

Work with the Bexley City Schools to schedule professionals from the SWACO to come in to educate students, faculty, and staff.	Create a list of local recycle haulers for the commercial sector and communicate information and web links to the City IT manager to list this information.
Meet with Capital University Sustainability Council to establish data needs and working relationship with City.	Map out drop-off recycle locations within a 2-mile radius of Bexley.

Infrastructure Needs

As discussed above, it is possible that one or more of the programs in Phase 1 or Phase 2 will need the development of additional infrastructure to allow implementation. These needs should be identified as soon as possible by the individual subcommittees and communicated to the ESAC, which should then discuss the information with SWACO.

APPENDIX A. DEFINITIONS

These definitions are part of SWACO's rules and solid waste management plan. Their purpose here is to give the reader an understanding of the terms and types of facilities used within a Zero Waste Plan (ZWP).

"Anaerobic Digestion" means a series of biological processes in which microorganisms break down biodegradable materials (e.g., livestock manure, municipal wastewater solids, food waste, wastewater and residuals, fats, oils and grease), in the absence of oxygen. One of the end products is biogas, which is combusted to generate electricity and heat, or can be processed into renewable natural gas and transportation fuels. Separated digested solids can be composted and used as soil amendments.

"Composting" means the process of converting organic matter (e.g., yard waste, food waste, livestock manure) into a soil amendment.

"District" means the jurisdiction of the Solid Waste Authority of Central Ohio and includes the territory of Franklin County and portions of Delaware, Fairfield, Licking, Pickaway, and Union Counties.

"Diversion" or "waste diversion" or "**landfill diversion"** is the process of redirecting materials away from the waste stream. Landfill diversion can occur through reuse, recycling, composting, anaerobic digestion, waste-to-energy or through other means. By diverting landfills, SWACO can extend the life of the landfill, add economic opportunity to the regional economy and preserve natural resources.

"Electronic Waste" or "E-Waste" means unwanted electronic appliances and devices, including but not limited to: computers, monitors, fax machines, copy machines, televisions, stereo/audio equipment, phones, cellular phones, personal digital assistants (PDAs), game consoles, video recorders, and electronics from industrial sources.

"Facility" or "Facilities" or "Solid Waste Facility or Facilities" means any site, location, tract of land, installation, or building used for: incineration, composting, sanitary landfilling, or other method of disposal of Solid Waste; the collection, storage, or processing of Scrap Tires; and includes any Solid Waste Disposal Facility, Solid Waste Energy Recovery Facility, Solid Waste Composting Facility, Solid Waste Transfer Facility, Solid Waste Recycling Facility, Legitimate Recycling Facility, or Resource Recovery Facility including Solid Waste Facilities as defined in Section 6123.01 of the Ohio Revised Code.

"Franklin County Sanitary Landfill" means the sanitary landfill owned and operated by SWACO located at 3851 London-Groveport Road in Jackson Township; and includes any vertical or horizontal expansion of that landfill.

"Generator" means a person who produces or creates Solid Waste.

"Hazardous Waste" means Solid Waste which, by reason of its listing, composition or characteristics is a hazardous waste (as defined in the Resource Conservation and Recovery Act, 42 U.S.C Section 6901 et seq., as amended (including, but not limited to, amendments thereto made by the Solid Waste Disposal Act Amendments of 1980) and related federal, state and local laws and regulations, or in any additional or substitute federal, state or local laws and regulations pertaining to the identification, treatment, storage or disposal of toxic substances or hazardous wastes; as any of the foregoing is from time-to-time amended or replaced.

"Legitimate Recycling Facility" means an engineered facility or site where Recycling of material other than scrap tires is the primary objective of the Facility, including: (a) Facilities that accept only Source Separated Recyclable Materials, except scrap tires, and/or commingled Recyclables which are currently recoverable utilizing existing technology; and (b) Facilities that: (i) accept mixed or Source Separated Solid Waste; (ii) recover for beneficial use not less than sixty per cent (60%) of the weight of Solid Waste brought to the Facility each month (as averaged monthly) for not less than eight (8) months in each calendar year, and (iii) dispose of not more than forty per cent (40%) of the total weight of Solid Waste brought to the Facility each month (as averaged monthly) for not less than eight (8) months in each calendar year.

"Modify" or "Modification" means a change in the operation of an existing in-District Solid Waste Facility that requires the approval of the Director of the Ohio Environmental Protection Agency; or, that involves a change in the type of material, manner of operation or activities conducted at the Solid Waste Facility that may directly or indirectly affect the Maximum Feasible Utilization of existing in-District designated Solid Waste Facilities.

"Plan" means the Solid Waste Management Plan of the Solid Waste Management District.

"Processed Infectious/Pathological Waste" means a portion of Solid Waste consisting of Infectious/Pathological Waste which has been rendered non-infectious by sterilization, incineration or other equally effective processing technique.

"Process" or "Processed" means incineration for resource recovery of Solid Waste or removal of Recyclable Materials, other than Source Separation at a Designated Solid Waste Facility.

"Recyclable Material" means Solid Waste that is, or may be, collected, sorted, cleansed, treated, or reconstituted for return to commerce. Recyclable Materials are identified in the Plan and include, but are not limited to: corrugated cardboard, office paper, newspaper, fiber materials, glass containers, steel containers, aluminum containers, plastic containers, wood packaging and pallets, lead-acid batteries, major appliances, electronic devices and Yard Waste.

"Recycle" or "Recycled" or "Recycling" means the process of collecting, sorting, cleansing, treating and reconstituting Solid Waste that would otherwise be disposed in a Solid Waste Disposal Facility and returning reconstituted materials to commerce as commodities for use or exchange.

"Recycling Services" means the collection, transportation, and delivery for processing of Solid Waste Recyclable Materials.

"Reuse" involves extending the life of a product, packaging or resource by using it more than once with little to no processing (same or new function), repairing it so it can be used longer, sharing/renting it, or selling or donating it to another party.

"Scrap Tire" means an unwanted or discarded tire.

"Solid Waste" means such unwanted residual solid or semisolid material as results from industrial, commercial, agricultural, and community operations, excluding earth or material from construction, mining or demolition operations, or other waste materials of the type that would normally be included in demolition debris, nontoxic fly ash, spent nontoxic foundry sand, and slag and other substances that are not harmful or inimical to public health, and includes, but is not limited to, garbage, tires, combustible and non-combustible material, street dirt, and debris. "Solid Waste" does not include any material that is an infectious waste or a Hazardous Waste.

"Solid Waste Collection Service" means the process, system, or service of collecting Solid Waste, including Recyclable Materials.

"Solid Waste Collection Facility" means any site, location, tract of land, installation, or building used for collection of Solid Wastes including Recyclable Materials.

"Solid Waste Composting Facility" means any site, location, tract of land, installation, or building used for composting Solid Waste where the owner or operator has met all

registration, licensing, or permitting requirements of rule 3745-27-41 of the Administrative Code.

"Solid Waste Disposal Facility" means any site, location, tract of land, installation, or building used for incineration, composting, sanitary landfilling, or other approved methods of disposal of Solid Waste.

"Solid Waste Energy Recovery Facility" means any site, location, tract of land, installation, or building where mixed Solid Waste or select sources of Solid Waste, including scrap tires, is used as or intends to be used as fuel to produce energy, heat, or steam.

"Solid Waste Facilities" include Solid Waste: Disposal Facilities, Energy Recovery Facilities, Resource Recovery Facilities, Composting Facilities, Transfer Facilities, Legitimate Recycling Facilities, Recycling Facilities, and Collection Facilities.

"Solid Waste Recycling Facility" means any site, location, tract of land, installation, or building used for Recycling Solid Waste.

"Solid Waste Resource Recovery Facility" includes Solid Waste Energy Recovery Facilities, Legitimate Recycling Facilities and Solid Waste Recycling Facilities.

"Solid Waste Transfer Facility" means any site, location, tract of land, installation or building that is used or intended to be used primarily for the purpose of transferring Solid Waste that is generated off the premises of the Facility from vehicles or containers into other vehicles for transportation to a Solid Waste Disposal Facility.

"Source Separate" or "Source Separation" means the process of separating, or the separation of, Solid Waste, including Yard Waste and Recyclable Materials, from other Solid Waste at the location where such materials are generated for the purpose of Recycling.

"Source Separated Recyclable Materials" means Solid Waste Recyclable Materials that are separated from other Solid Waste at the location where such materials are generated for the purpose of Recycling.

"Unwanted" means to discard, abandon, or deliver to any location, for subsequent collection and removal, any residual solid or semisolid material as results from industrial, commercial, agricultural, and community operations, excluding earth or material from construction, mining or demolition operations, or other waste materials of the type that would normally be included in demolition debris, nontoxic fly ash, spent nontoxic foundry sand, and slag and other substances that are not harmful or inimical to public

health, and includes, but is not limited to, garbage, Scrap Tires, combustible and non-combustible material, street dirt, and debris without payment to the Generator. For purposes of this definition, "payment" means money received by a Generator, in excess of the cost incurred, attributed or imputed to the Generator, relating to the collection or removal of such materials.

"White Goods" means a portion of Solid Waste consisting of a large appliance (i.e., weighing more than fifty (50) pounds) including the following:

i. air conditioners;
ii. clothes and drying machines;
iii. dish washers;
iv. furnaces and electric heaters;
v. hot water heaters;
vi. refrigerators and freezers;
vii. stoves, ovens, cook surfaces and microwave ovens; and
viii. residential trash compactors.

"Yard Waste" means all garden residues, leaves, grass clippings, shrubbery and tree prunings less than one-quarter inch in diameter, and similar material. Yard Waste collected for residents by political subdivisions or their contractors is considered municipal Yard Waste. All other yard waste is non-municipal Yard Waste.

APPENDIX B. COMMERCIAL SECTOR RESOURCES

State and Local Approaches

Many different approaches have been used to promote greater recycling in the commercial sector. The City of Seattle has implemented mandatory recycling laws for both businesses as well as citizens by charging fines to those who throw away recyclable materials. The State of Minnesota has adopted recycling laws that are stricter for commercial entities and sporting facilities. California is working to encourage increased recycling in the commercial sector by implementing a mandatory commercial recycling law.

In Minnesota, a state law passed by the Legislature in 2014 made recycling mandatory for most Twin Cities businesses. The law requires retailers, wholesalers, service companies and other industries in the metro area — that contracts for at least four cubic yards of trash collection — to recycle at least three items. The commercial recycling law became effective on January 1, 2016.

Recycling is required at commercial buildings Minneapolis which have trash collection. Recycling containers are required for those materials that are generated at the building and designated as recyclable materials in accordance with City code. Collection and delivery of recyclable materials to a recycling facility is also required as well as distribution of written information and instructions to building tenants describing the recycling program.

Resources from U.S. EPA

The following information is copied from U.S. EPA's website.

> *Procurement Best Practices: Mandatory Recycling and Composting*
>
> Some states and communities adopt mandatory recycling and composting laws and ordinances. Requiring all commercial and/or residential generators to recycle and/or compost means that local government or contractors must provide recycling and composting services to all customers.
>
> Communities don't have to couple "exclusive" agreements with mandatory recycling. Some jurisdictions have structured "semi-exclusive" agreements where a limited number of permits are available – similar to how cities distribute taxi cab medallions.
>
> Alternatively, "universal roll-out" can be provided, meaning that recycling, composting and waste bins and services are provided to all customers, rather than having separate recycling and compost collection service subscription from trash collection. Local

governments can also require service providers to offer recycling and composting services to all garbage customers as a condition of providing services. See:

https://www.epa.gov/transforming-waste-tool/procurement-best-practices-mandatory-recycling-and-composting

Contracting Best Practices

A wide range of contracting strategies designed to advance towards zero waste are being used by local governments.

Many contracting best practices align incentives between the local governments, contractors and generators to fund for diversion programs and facilities and encourage waste reduction, recycling, and composting. See:

https://www.epa.gov/transforming-waste-tool/contracting-best-practices

Transforming Waste Streams Tool

General information regarding U.S. EPA's "Transforming Waste Tool" which is discussed above can be found in a webinar posted on U.S. EPA's website. The planning tool is designed to allow:

> "…users to explore 100 policy and program options, including 38 measures addressing organic waste. The tool illustrates different approaches to materials reuse and recovery objectives, whether in the form of enhancing curbside collection, adopting requirements, conducting community outreach, promoting infrastructure development, or engaging in product stewardship. It can lend support to local or regional solid waste plan updates or zero waste plans. The tool contains over 250 implementation examples from communities across the country, with links to city and county ordinances, contract language, and program websites."

The webinar is available at: https://www.epa.gov/smm/sustainable-materials-management-smm-web-academy-webinar-how-communities-can-transform-waste

Resources from California's Institute for Local Government

Founded in 1955, the Institute for Local Government serves counties, cities and special districts in California, and provides resources for communities. Recycling Guides for Rental Property Owners, Managers and Tenants, Commercial Recycling Resources for Business Owners and Managers:

- a 15-page planning guide to assist developers on recycling considerations when designing a project;
- a 16-page guide to explain how businesses can reduce waste, reduce their solid waste utility bill, lower their purchasing costs, and reduce their overall waste footprint. The guide includes tips on packaging and plastic waste reduction, how to encourage employees to reduce waste, and more; and
- 16-page booklet to explain recycling requirements to owners and managers. Explains what must be recycled and what businesses must comply. Also explains self-haul option and answers FAQs.

  http://www.ca-ilg.org/commercial-recycling-resource-center

Franchising for Collection

From the Minnesota Pollution Control Agency website:

> "In 2009, the Minnesota Pollution Control Agency (MPCA) commissioned a study to develop quantifiable information comparing open and organized municipal solid waste (MSW) and recycling collection systems. The analysis revealed that organized collection systems consistently result in lower overall costs to consumers. In addition, recycling capture rates are typically higher in organized systems. Organized collection also reduces noise pollution, road wear, air emissions and fuel consumption. In an open collection system, individual customers choose their own waste hauler. In an organized system, waste hauling services are coordinated by a public entity through a competitive bidding process." (See https://www.pca.state.mn.us/sites/default/files/leg-12sy1-06.pdf)

The complete Minnesota study is available at:

https://www.pca.state.mn.us/sites/default/files/w-sw1-06.pdf

The following table shows the pros and cons of having an open market collection system (each business contracts for collection separately) as characterized by Thomas Douglas from the City of Gainesville, Florida.

Open Market Commercial Hauling Pro's and Con's	
Pro's	**Con's**
1. Choice of hauler	1. Multiple year hauler contracts with rollover clauses
2. Ability to Negotiate Price	2. Restrictive Service Agreement
3. Compare Hauler Customer Service Policies	3. Unregulated Rates and Charges
4. Ability to Tailored/Customized Services	4. City does not know which businesses do/do not have service
5. Hauler does the billing	5. No flow control
6. Potential for small haulers in enter market	6. City loses discounted residential tipping fees due to less total disposal tonnage
7. Competition between Haulers for business	7. Inefficiency of multiple haulers
8. Opportunities for innovation in equipment	8. Infrastructure damage due to increased multiple hauler traffic
9. Customer service is hauler responsibility	9. Non-uniformity of hauler equipment, signage and esthetics
	10. Can be difficult to get hauler dumpsters repaired, painted or deodorized
	11. Billing disputes and stop service issues
	12. Recycling and Garbage pricing differences
	13. No ability to track and collect data with RFID or GPS
	14. Difficult to do waste audit and recycling cost reductions
	15. Little incentive for hauler to provide comprehensive recycling services
	16. Haulers less likely to provide innovative recycling service
	17. Pilot recycling programs hard to start
	18. Local government is out of the hauler/business communication loop.
	19. Large companies/companies represented by waste brokers tend to get the best rate
	20. Extra pickup charges tend to be much higher.
	21. The formula for fuel surcharges, environmental surcharges, service level increases/decreases and disposal increases varies from hauler to hauler. These fees may vary from customer to customer who have the same hauler.

Franchising can be controversial as experienced in some communities in the United States. (See http://www.twincities.com/ci_21672036/maplewood-kicks-off-its-single-hauler-trash-collection)

The City of Fort Saskatchewan has a long history of franchising waste collection, and according to this posting on the Solid Waste Association of North America (SWANA) message board in 2015, their experience has been positive:

> "Our Franchise contract expires in 2016 and we are having same debate. That said, we have had a commercial franchise set-up for at least 20 years and the Chamber of Commerce continues to support that model. Our contract terms have traditionally been 5-years.
>
> Our reasons are benefits of efficiency, less wear & tear, and better pricing due to volume and stability. I very much agree with the pros / cons (of open market) listed by the last poster and our belief is that the cons of open market (or benefits of franchise) outweigh.
>
> That said I have had some complaints that the market has changed in the past five years and that our regulated rates are no longer competitive and some other haulers offer more innovative commercial recycling/organics collection than our franchise contractor. We also do not currently collect any administration fees or franchise fee which leads to some questions regarding commercial use of our local transfer station/hazardous waste drop off and other expenses with no revenue source.
>
> Going forward, my preference is still for franchise but we will be looking for feedback from the business/light industry community. When we renew the contract, we will go to Proposal, not Quote, to allow decision to be based in part on service levels and innovations (as well as rates) and we will also consider pros/cons of shortening the contract term (3 years vs 5) and we are looking at franchise fees or admin fees to commercial accounts.
>
> Of note, we have bylaws in place to require that business go with the franchise hauler, which supersedes corporate agreements some large retailers may have. I wasn't around for the last renewal so I do not know if there were concerns but since it is the way it 'has always been' here, I don't think they really care. Construction and heavy industry are exempt."
>
> ---
> Bradley McDonald
> City of Fort Saskatchewan Public Works
> Manager, Utility Services

APPENDIX C. EDUCATION AND PROMOTION OF THE ZWP

There are many ways to educate and promote a Zero Waste Plan (ZWP). The following points have been further expanded from the Section 6 of the City of Bexley's Zero Waste Plan to give guidance and examples.

1. **Establish an Education and Outreach Planning Subcommittee.**
    a. The Subcommittee is responsible for the preparation, execution, and maintenance for the Education and Promotion of the ZWP.
    b. A suggested size for the Subcommittee would be 3-5 members of the Bexley Green Team.
    c. The Subcommittee should meet once a month to work and meet the goals for the Education and Promotion of the Zero Waste Plan.

2. **Develop a formal schedule to present the ZWP to the community.**
    Sample Schedule until December 2017:
        I. May:
            i. Establish goals the Education and Outreach Planning Subcommittee wants to achieve.
            ii. Host a subcommittee meeting to define roles.
            iii. Establish who will facilitate the meeting.
            iv. Determine who will make presentations.
            v. Identify location for the meeting.
            vi. Create an invitation for the community calendar for both Public Comment Meetings. (June and July)
            vii. Prepare presentation for Public Comment Meeting #1
        II. June:
            i. Public Comment Meeting #1
            ii. Prepare presentation for Public Comment Meeting #2
        III. July:
            i. Public Comment Meeting #2
            ii. Prepare for Bexley Day
        IV. August:
            i. Bexley Day – hang educational banners
        V. September:
            i. Draft Facebook/Social Media Posts.
            ii. Develop or collect brochures/pamphlets about recycling and waste reduction to provide at each event the Green Team will be promoting the ZWP.

VI. October:
    i. Facebook: Awareness plan with posts to inform the community about the ZWP and its goals.
    ii. Draft ZWP flyers for residents on phase one priorities.
VII. November:
    i. Facebook: Information on program priorities through the ZWP.
    ii. Review and get flyers printed about ZWP for 2018
    iii. Develop a plan with SWACO to help educate public schools.
VIII. December:
    i. Mail ZWP flyers to residents
    ii. Facebook: What is coming in 2018 and how residents will receive more information about programming.
    iii. Develop ongoing schedule for phase one education and outreach planning.

3. Create educational signs to brand ZWP for high traffic areas in Bexley.

The subcommittee should develop educational signs for residents and visitors to see during public events. The signs should educate, publicize, and provide a positive theme for zero waste in the community. It is important to keep the message similar across different media such as signs, social media, and flyers.

a. Example slogans:
    I. "Keep Bexley a Zero Waste City"
    II. "Be Green for the Bexley Scene"
    III. "Don't trash our Bexley future: Reduce, Reuse, Recycle."
b. Use statistics for messaging
    I. https://www.epa.gov/sites/production/files/2015-09/documents/2013_advncng_smm_fs.pdf
        i. "Every ton of mixed paper recycled can save the energy equivalent of 166 gallons of gasoline."
        ii. "On average, Americans recycled and composted 1.51 pounds out of our individual waste generation rate of 4.40 pounds per person per day."
        iii. "The aluminum industry is eager for more aluminum cans – yet in the U.S. we dispose of nearly half of our cans, which by the way are valued at nearly $1 billion."
c. Signs/banners should be placed in visible areas:
    I. Recreational parks
    II. The community center
    III. Pool
    IV. Grocery store
    V. Library
    VI. Community garden

VII. Police station

d. Banner Example:

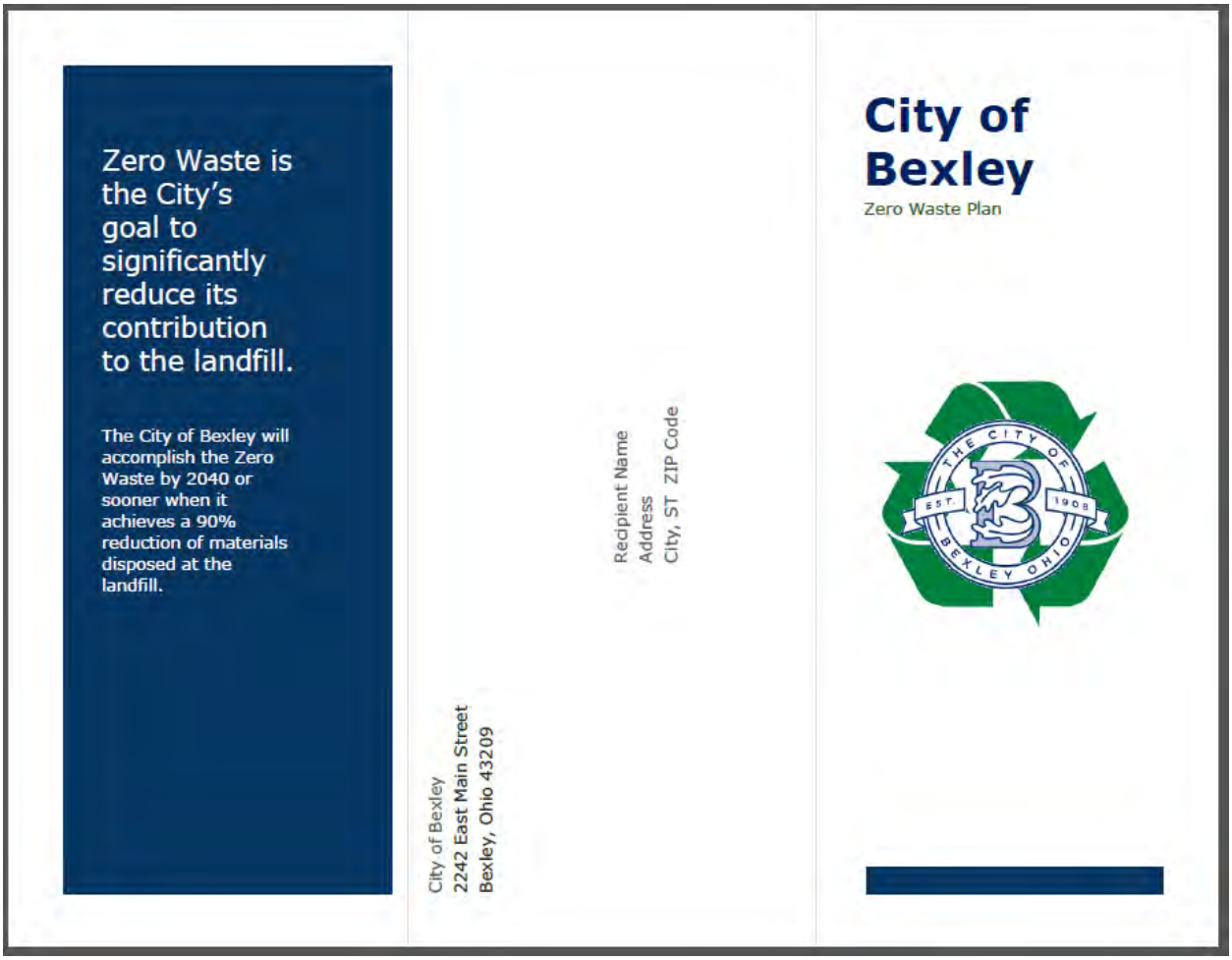
e. Educational Videos for Pay-As-You-Throw:
   I. PayAsYouThrow Part1 https://www.youtube.com/watch?v=Pr_RIIb2CYg
   II. PayAsYouThrow Part2 https://www.youtube.com/watch?v=SBY4m5GOOI4
   III. Pay As You Throw: Your Trash May Be Recyclable – Merrimack, New Hampshire https://www.youtube.com/watch?v=l_JCZRiG7Fw
   IV. Pay As You Throw – San Antonio https://www.youtube.com/watch?v=EQMOPGI9eKM

f. Educational Pieces:
   I. Beyond the Curb - What Happens Next? http://www.rumpke.com/education/recycling-videos
   II. PDF of Dallas 2011 - 2060 https://dallascityhall.com/departments/sanitation/DCH%20Documents/pdf/DallasLocalSWMP_Vol-I-II.pdf

4. Develop a specific plan for informing residents about new programming.

The subcommittee will need to plan outreach to the residents using paper flyer/brochures and social media will help spread the word throughout Bexley.

a. Be present at community events to publicize the ZWP:
   I. Some events include: July 4th parade, Bexley Day founded 1908 – August 10th, and Labor Day Block Party - September
   II. Develop or collect brochures/pamphlets to provide at each event about recycling and waste reduction
b. Prepare flyers that will be mailed to residents.
c. Use social media to inform residents of where the Green Team will be present and of any documents they might see in the mail soon.
d. The Subcommittee should attend events and promote the ZWP.
e. Sample brochure:


Zero Waste is the City's goal to significantly reduce its contribution to the landfill.
The City of Bexley will accomplish the Zero Waste by 2040 or sooner when it achieves a 90% reduction of materials disposed at the landfill.
City of Bexley
2242 East Main Street
Bexley, Ohio 43209
Recipient Name
Address
City, ST ZIP Code
City of Bexley
Zero Waste Plan
THE CITY OF
EST.
1908
BEXLEY OHIO

Do you own a business?

Contact the City to find out how you can get a recycling sign publicizing that you recycle. Let your customers know you go the extra mile toward zero waste.

Responsible
Recycling Business

Do you need a hauler?

Take a look at the bexley.org/recycle website. There is a list of some recycling haulers that service the Bexley area.

"Every ton of mixed paper recycled can save the energy equivalent of 166 gallons of gasoline."
-EPA, 2013

New programs will be rolling out in 2018. Check social media and your mailbox for further updates!

What can you recycle?

• **Paper**	Office, Newspaper, Junk Mail, Envelopes Newspapers, Magazines and Inserts, Telephone Books and Catalogs
• **Plastics**	Bottles and Jugs
• **Cartons**	Juice and Milk
• **Cardboard**	Corrugated, Cereal Boxes
• **Glass**	Bottles and Jars
• **Metals**	Aluminum Cans, Steel Cans & Lids

Facebook

Check out our Facebook page for further updates

How do we achieve Zero Waste?

- Reuse
- Reduce
- Recycle

Contact Us

2242 East Main Street
Bexley, Ohio 43209

Phone: (614) 559-4220
Fax: (614) 559-4201

http://www.bexley.org/recycle

5. Provide businesses that recycle materials a sign with an emblem of Bexley that advertises to the public that this business recycles.

Customers may gain more respect for a business who is responsible for the materials that it disposes. The Subcommittee should create a form that businesses can fill out to be approved to receive their sign. Must show proof they recycle by providing data on amount of material diverted. The subcommittee can give laminated signs that can be displayed.

a. Example: Responsible EMBLEM Recycling Business

Responsible

Recycling Business

6. Work with the Bexley City Schools to schedule professionals from the SWACO to come in to educate students, faculty, and staff.

Bexley City Schools is already a part of the School District Waste and Recycling Consortium program which increases opportunities for collection services. SWACO offers an E-Waste consortium that Bexley's school district may consider participation. SWACO works to improve their outreach programs and there are opportunities for pilot programs. Bexley City Schools could test in these programs in their school district. Further, SWACO offers landfills tours for schools to aid in waste education.

7. Meet with Capital University Sustainability Council.

Capital University is a large institution in the City of Bexley. Meeting with their Council will help spread ideas and promote recycling whether a student is on campus or at a local park.

a. Sample Agenda
   I. Introductions
   II. Discuss goals
   III. What is Capital already doing? The Subcommittee can explore how they can work with other institutions within Bexley.
   IV. Suggest them to create their own ZWP if they don't already have one
   V. Are there any messages both teams want to make sure line up

8. **Coordinate with the City's IT person and webmaster for social media material.**
It is important to have a meeting with IT and discuss a schedule of when the Subcommittee would like social media post to be seen. Discuss social media options such as Facebook's options to schedule content to be posted at a designated time. Add events such as the Public Comment Meetings to the City Calendar. Keeping the ZWP transparent and information readily shared will help and increase favorable results.

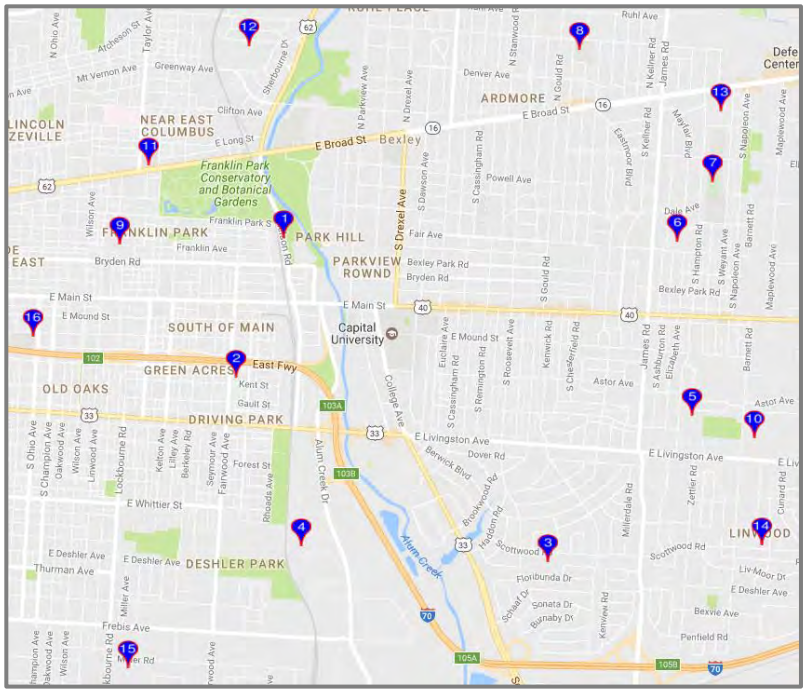
9. **Create a web-based directory of local reuse and recycling options for all types of materials.**
The local recycle hauler does not take every kind of material that falls under the reuse, reduce, recycle. There are places to drop-off or mail used items that cannot be recycle by curbside. Find places that can reuse or recycle: clothes, winter clothes, shoes, school/office supplies, etc. Include the types of items and a link to where they can get more information.
Sample websites:
   a. www.freecycle.org
   b. www.goodwillcolumbus.org
   c. www.columbusrunning.com
   d. www.frontrunnercolumbus.com
   e. https://www.swaco.org/

10. **Create a list of local recycle haulers for the commercial sector and communicate information and web links to the City IT manager to list this information.**
The following list are some of the local haulers who service the area. Businesses should be encouraged to "shop" or competitively bid for a recycling hauler. Multiple businesses can possibly share recycling containers for commercial strip centers.

Hauler	Commercial	Industry	Plastic	Paper	Cardboard	Glass	Metals	Electronics	Other
Capitol Waste & Recycling Services **321 Dering Ave.** **Columbus, OH 43207** **614-445-9900** **www.capitol-waste.com** **info@capitol-waste.com**	Yes	Yes	Call for guidelines	Yes	Yes	Yes	Yes	Electronics and Equipment	Batteries/Bulbs
Farmer's Refuse & Trucking Inc **1952 Linton Road** **Logan, OH 43138** **740-385-7228** **www.farmersrefuse.com** **farmertrash@roadrunner.com**	Yes	Yes	?	?	Yes	?	Yes	?	Wood
Frog Hauling LLC **1601 West 5th. Avenue #127** **Columbus, OH, 43212** **614-258-3764** **www.froghauling.com/**	Yes	No	?	?	?	?	?	?	

Global Container Service Inc. **5501 Westerville Rd** **Westerville, OH 43081** **614-882-0363** **www.globalcontainer.net/** **info@globalcontainer.net**	Yes	No	?	?	Yes	?	Yes	No	Wood concrete
Junk King **819 Phillipi Road** **Columbus, OH 43228** **614-467-4156** **www.junk-king.com**	Yes	Yes	No	No	No	No	No	Televisions	Refrigerators Freezer
Local Waste **1300 S Columbus Airport Rd** **Columbus, OH 43207** **614-409-9375** **www.localwasteservices.com/** **info@localwasteservices.com**	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	
Republic **5131 Drinkle Road** **Amanda , OH 43102** **740-969-4487** **www.republicservices.com**	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	
Rumpke **1191 Fields Ave** **Columbus, OH 43201** **1-800-828-8171** **http://www.rumpke.com/**	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	
Srose Enterprises LTD (dba 1-800-GOT-JUNK) **1187 Cleveland Ave** **Columbus, OH 43201-2972** **614-499-3461** **www.1800gotjunk.com**	Yes	Yes	No	No	No	No	Scrap Metal	Electronics	
Waste Management **1006 Walnut Street** **Canal Winchester, OH 43110** **866-797-9018** **www.wm.com**	Yes	Yes	Yes	Yes	Yes	Yes	Yes	?	

11. Map out drop-off recycle locations within a 2-mile radius of Bexley.



Legend Drop-offs within a 2-mile radius of Bexley	
1	Cleo Dumaree Athletic Complex, 276 South Nelson Road 43205, Available 24 hours
2	Fairwood Elementary School, 726 Fairwood Avenue 43205, Available 24 Hours
3	Berwick Elementary School, 2595 Scottwood Rd., M-F: 5pm-9pm, Sat/Sun: 9am-6pm
4	Recreation/Park Main Office, 1533 Alum Industrial Dr W Available 24/7
5	Johnson Park Middle School, 1130 S. Waverly St., M-F: 5pm-9pm, Sat/Sun: 9am-6pm
6	Fairmoor Elementary, 3281 Mayfair Park, M-F: 5pm-9pm, Sat/Sun: 9am-6pm

7	Eastmoor Academy, 417 S Weyant Ave., M-F: 5pm-9pm, Sat/Sun: 9am-6pm
8	Broadleigh Elementary, 3039 Maryland Ave., M-F: 5pm-9pm, Sat/Sun: 9am-6pm
9	Columbus Prep. for Girls, 1390 Bryden Road, M-F: 5pm-9pm, Sat/Sun: 9am-6pm
10	Barnett Recreation Center, 1184 Barnett Road, Available 24 hours
11	East High School, 1500 E. Broad Street 43205, Available 24 Hours
12	Eastgate Elementary, 1925 Stratford Way Columbus, OH 43219, M-F: 5pm-9pm, Sat/Sun: 9am-6pm
13	Columbus City Preparatory School for Boys, 3450 Medway Ave., M-F: 5pm-9pm, Sat/Sun: 9am-6pm

	Scottwood Elementary, 3392 Scottwood Rd., M-F: 5pm-9pm, Sat/Sun: 9am-6pm
	Moler/Heyl Elementary, 1560 Moler Rd., M-F: 5pm-9pm, Sat/Sun: 9am-6pm
	Ohio Elementary, 505 S. Ohio Ave., M-F: 5pm-9pm, Sat/Sun: 9am-6pm

APPENDIX D. ENVIRONMENTALLY-PREFERABLE PURCHASING POLICIES

Environmentally-Preferable Purchasing (EPP) is the procurement of goods and services that have less negative effects on human and environmental health when compared with competing products and services that serve the same purpose. Section 1 of this appendix presents an overview of this topic, while sections 2 and 3 includes additional resources related to EPP, including a model environmentally-preferable purchasing policy developed by STOPWASTE and an example of environmentally preferable purchasing guidelines adopted by Duke University.

1. Environmentally-Preferable Purchasing Overview

EPP policies serve many purposes, including:

- Reducing environmental footprint of DRSS;
- Conserving resources;
- Minimizing environmental impacts;
- Eliminating or reducing toxins that create hazards to human health;
- Strengthening recycling markets by creating a demand for products manufactured with recyclable materials;
- Reducing materials that are landfilled; and
- Rewarding manufacturers, vendors, and service providers that are environmentally conscious.

The Santa Cruz City School District's EPP Policy suggests that the comparison of competing products can consider the following:

- Environmental cost of acquiring raw materials
- Production
- Manufacturing
- Packaging
- Distribution
- Reuse
- Operation
- Maintenance
- Disposal

An effective EPP Policy should be both fiscally and environmentally sustainable. Price, performance, and environmental considerations should be balanced when selecting goods and services. For example, the institutions and businesses could consider purchasing recycled-content paper products instead of non-recycled products whenever recycled-content products are available within a 5% cost differential. The reasonable cost differential for other categories will vary.

In an environment with many competing priorities, finding time or resources to devote to implementing an EPP policy or guidelines may be challenging. The National Association of State Procurement Officials (NASPO) included a section in its Green Purchasing Guide titled "Easing the Burden of Buying Green." The section aims to assist organizations with limited resources on jumpstarting green procurement. According to NASPO, the following list of products and services represents the greatest opportunities for early successes with green procurement:

- ***Recycled content products***
  Utilizing materials collected in municipal, business, and other recycling programs strengthens revenue markets for those reused materials, reduces the waste stream going to landfills and incinerators, and works to create economic development opportunities within the emerging industry. Products containing post-consumer recycled content are available for paper goods, plastics, metals, petroleum products, and more. Such products include office papers and envelopes, packaging, plastic lumber, traffic cones, re-refined motor oil, antifreeze, and toner cartridges, just to name a few.

- ***Green cleaning products***
  According to various reports, as many as one of three cleaning chemicals is considered hazardous due to their flammable, corrosive, or toxic properties. There also may be safety, health, and cost concerns in the handling, storage, and disposal of these chemicals. Some of the chemicals may not cause immediate injury, but rather are associated with cancer, reproductive disorders, respiratory, skin damage, and other health conditions. As a result, many state, local governments, and schools are requiring the use of more benign, but equally high-performing green cleaning products, and they are requiring the products meet the standards of third-party organizations like Green Seal, UL Environment, or EcoLogo. There are an ever-growing number of products now being used by states across the country that not only provide improved environmental and health benefits, but will also save money.

- ***Environmentally preferable paper***
  Admittedly, paper products may not always be the easiest low-hanging fruit to pluck. Markets for paper recycling are ever-changing, but paying attention to environmental attributes is particularly important because this industry has such a huge impact on forests and is one of the largest consumers of water and energy. It is crucial for complying with federal standards for recycled content on janitorial papers, office paper, and envelopes, to specify a goal of being 100% post-consumer recycled content paper, processed chlorine-free, or post-consumer recycled content to the maximum practicable level. For less than

100% post-consumer recycled content, use post-consumer recycled content to the maximum extent practicable. Also, use non-recycled content derived from a sustainably-managed renewable resource and certified as such through an appropriate third party certification program recognized by the paper industry, such as the Forest Stewardship Council (FSC) or Sustainable Forestry Initiative (SFI). Depending on the volume of paper purchased and the region of the country, many buyers are able to procure environmentally preferable paper without increasing costs. Others implement paper reduction strategies and offset differences in price by setting office equipment to default to duplex printing, widening margins, and encouraging paperless practices to. It is also recommended that publications and other printed items use processed chlorine-free (PCF) paper to the maximum extent possible.

- ***Green computers and office equipment***
  While maximizing energy efficiency remains an important consideration in procuring computers and office equipment, purchasers now are able to examine the environmental impacts that come into play within each phase of a product's life, from raw materials extraction and the quantities of energy and water consumed in the manufacturing process, to the end-of-life handling and disposal of hazardous materials in certain components. Using EPEAT, purchasers can evaluate, compare, and select desktop computers, notebooks, and monitors based on their environmental attributes. Products are required to meet nearly two dozen environmental criteria as well as numerous other options. As of early 2008, federal government agencies are required to procure EPEAT registered computer products, with other state and local governments following suit. (Details can be found at www.epeat.net/). UL Environment also offers a similar standard for printers, scanners, copiers, and other office equipment.

- ***Ink***
  Printing should require the use of water or vegetable-based lithographic ink to the maximum extent practicable, which will reduce the amount of VOCs released into the environment. Wherever possible, printing should reduce or eliminate the use of color.

- ***Services***
  Buyers may also include these requirements in service contracts, including landscaping, custodial, printing, pest control, and other services contracts.

2. Duke University: Environmentally Preferable Purchasing (EPP) Guidelines

The following guidelines are available on Duke University's website at:
https://sustainability.duke.edu/documents/EPP%20Guidelines%207-8-04.pdf

A. Purpose

Recognizing our impact as a major purchaser of goods and services, Duke University gives preference to environmentally friendly products whose quality, function, and cost are equal or superior to more traditional products. This policy will:

- conserve natural resources
- minimize pollution
- reduce the use of water and energy
- eliminate or reduce environmental health hazards to workers and our community
- support strong recycling markets
- reduce materials that are landfilled
- increase the use and availability of environmentally preferable products
- reward vendors who reduce environmental impacts in their production and distribution systems or services
- create a model for successfully purchasing environmentally preferable products that encourages other purchasers in our community to adopt similar goals
- support locally produced goods and services
- educate ourselves, our vendors, and our end users

B. Definitions

Environmentally Preferable Product: A product that has a lesser or reduced negative effect on human health and the environment when compared to competing products that serve the same purpose. This comparison may consider raw materials acquisition, production, manufacturing, packaging, distribution, reuse, operation, maintenance, and disposal of the product. This term includes recyclable products, recycled products, and reusable products.

Life Cycle Analysis: The comprehensive examination of a product's environmental and economic effects throughout its lifetime, including new material extraction, transportation, manufacturing, use, and disposal.

Practicable: Satisfactory in performance and available at a fair and reasonable price.

Post-consumer Content: The percentage of materials collected from end-users and recycled into the new product.

Recyclable Product: A product that, after its intended end use, can be demonstrably diverted from the University's solid waste stream for use as a raw material in the manufacture of another product, preferably higher value uses.

Reusable Product: A product, such as a washable food or beverage container or a refillable ballpoint pen, that can be used several times for an intended use before being discarded.

Data Collection and Performance Reporting
For purposes of setting goals and evaluating the performance of the University's green purchasing program, vendors may be requested to report the environmental attributes of their products.

C. Procurement and Supply Chain Management responsibilities:

- Collaborate with vendors to design and implement a data collection system for tracking the environmental attributes of products
- Compile records for the purpose of producing an annual summary of the University's environmentally responsible purchasing actions, and for evaluating the effectiveness of these actions in reducing the environmental impacts of University procurement
- Identify opportunities to educate end users about the impacts of their product choices

D. Priorities

- Ensure the health and safety of workers and citizens
- Support the Durham economy by purchasing goods and services from local vendors
- Procure goods and services that are environmentally friendly without compromising cost or quality
- Comply with all local, state, and federal laws that govern our procurement activity

E. Areas of Focus

1. Source Reduction

Reducing unnecessary waste at the source allows the University to both mitigate the inefficient use of our natural resources and benefit economically from decreased handling and disposal costs.

Procurement activity may include:

- Institute practices that reduce waste, resulting in the purchase of fewer products whenever practicable and cost-effective, but without reducing safety or workplace quality
- Purchase remanufactured products such as laser toner cartridges, tires, furniture, equipment and automotive parts whenever practicable, but without reducing safety, quality or effectiveness
- Consider short-term and long-term costs in comparing product alternatives. Include evaluation of total costs expected during the time a product is owned, including, but not limited to, acquisition, extended warranties, operation, supplies, maintenance, disposal costs and expected lifetime compared to other alternatives
- Purchase products that are durable, long lasting, reusable or refillable
- Request that vendors eliminate packaging or use the minimum amount necessary for product protection to the greatest extent practicable
- Request packaging that is reusable, recyclable or compostable when suitable uses and programs exist
- Reuse pallets and packaging materials
- Require that all equipment bought after the adoption of this Policy, when practicable, be compatible with products and services that provide source reduction benefits

2. Recycled Content Products

The University has made significant investments in developing a successful recycling system and recognizes that recycled content products are essential to the continuing viability of that recycling system, and for the foundation of an environmentally sound production system.

Procurement activity may include:

- Products for which the United States Environmental Protection Agency (U.S. EPA) has established minimum recycled content standard guidelines – such as printing paper, office paper, janitorial paper, construction, landscaping, transportation, vehicles, and non-paper office products – and which contain the highest post-consumer content practicable, but no less than the minimum recycled content standards established by the U.S. EPA Guidelines.
- Copiers and printers that can be used with recycled content products
- Re-refined lubricating and industrial oil for use in vehicles and other equipment, as long as the product is certified by the American Petroleum Institute (API) as appropriate for use in such equipment

- Asphalt concrete, aggregate base or portland cement concrete for road construction projects that contains recycled, reusable or reground material
- Recycled content transportation products including signs, cones, parking stops, delineators, and barricades

3. Energy and Water Savings

Recognizing that the generation of electricity is a major contributor to air pollution and global warming issues, and that clean water is a finite resource, the University values products that minimize the use of these valuable resources.

Procurement activity may include:

- Energy-efficient equipment with the most up-to-date energy efficiency functions, including, but not limited to, high-efficiency heating and cooling systems.
- Efficient lighting with energy-efficient equipment
- Products for which the U.S. EPA Energy Star certification is available and which meet Energy Star certification, when practicable. When Energy Star labels are not available, choose energy-efficient products that are in the upper 25% of energy efficiency as designated by the Federal Energy Management Program
- Water-saving products.

4. Landscaping

Supporting low maintenance and environmentally sensitive landscapes minimizes the unnecessary use of fertilizers and water resources, therefore reducing the University's impact on the natural environment.

Procurement activity may include:

- Employ sustainable landscape management techniques for design, construction and maintenance. These techniques include, but are not limited to, integrated pest management, grasscycling, drip irrigation, composting, and procurement and use of mulch and compost that give preference to those produced from regionally generated plant debris and/or food waste programs.
- Minimize waste by selecting plants that are appropriate to the microclimate, species that can grow to their natural size in the space allotted them; Place preference on native and drought-tolerant plants that require no or minimal watering once established.
- Limit amount of impervious surfaces by procuring permeable substitutes such as permeable asphalt or pavers for walkways, patios and driveways.

5. Toxics and Pollution

The use of toxics and the generation of pollution should be minimized to reduce risks to health, safety, and the environment.

Procurement activity may include:

- Refrain from procuring cleaning or disinfecting products (i.e. for janitorial or automotive use) containing carcinogens, mutagens, or teratogens. Chemicals to be avoided are listed by the U.S. EPA or the National Institute for Occupational Safety and Health on the Toxics Release Inventory.
- Phase out chlorofluorocarbon-containing refrigerants, solvents and similar products.
- Procure readily biodegradable surfactants and detergents that do not contain phosphates.
- Maintain buildings and landscapes, manage pest problems through the application of prevention techniques and physical, mechanical and biological controls
- Procure products with the lowest amount of volatile organic compounds (VOCs), highest recycled content, and low or no formaldehyde in materials such as paint, carpeting, adhesives, furniture and casework.
- Reduce or eliminate the use of products that contribute to the formation of dioxins and furans, including, but not limited to:
- Paper, paper products, and janitorial paper products that are bleached or processed with chlorine or chlorine derivatives
- Products that use polyvinyl chloride (PVC), including, but not limited to, office binders, furniture, flooring, and medical supplies
- Procure products and equipment with no lead or mercury. For products containing lead or mercury, give preference to those with lower quantities of these metals and to vendors with established lead and mercury recovery programs.
- Consider vehicle procurement alternatives to diesel such as compressed natural gas, bio-based fuels, hybrids, electric batteries, and fuel cells, as available.

6. Forest Conservation

The University has made significant investments in sustainable forestry, evident in the preservation of 7,000 acres of Duke Forest. That commitment extends to the purchase of wood products, in recognition of the valuable human and ecological health services provided by forests.

Procurement activity may include:

- Procure wood products such as lumber and paper that originate from forests harvested in an environmentally sustainable manner. Give preference to wood products that are certified to be sustainably harvested by a comprehensive, performance-based certification system. The certification system shall include independent third-party audits, with standards equivalent to, or stricter than, those of the Forest Stewardship Council certification.

- When practicable, procure locally, sustainably harvested wood.

7. National League of Cities

The Sustainable Cities Institute operating under the auspices of the National League of Cities provides a number of resources for establishing an environmentally preferable purchasing policy. Their website can be found at:

http://www.sustainablecitiesinstitute.org/topics/materials-management/environmentally-preferrable-purchasing-(epp)

F. StopWaste Model Environmentally Preferable Purchasing Policy

The following model policy can be found at this website:

http://www.stopwaste.org/home/index.asp?page=439

1.0 STATEMENT OF POLICY

It is the policy of [Organization] to:

- Institute practices that reduce waste by increasing product efficiency and effectiveness;

- Purchase products that minimize environmental impacts, toxics, pollution, and hazards to worker and community safety;

- Purchase products that reduce greenhouse gas emissions in their production, shipping, use and discard; and

- Purchase products that include recycled content, are durable and long-lasting, conserve energy and water, use agricultural fibers and residues, use

unbleached or chlorine free manufacturing processes, are lead-free and mercury-free, and use wood from sustainably harvested forests.

2.0 PURPOSE

This Policy is adopted in order to:

- Conserve natural resources,
- Minimize environmental impacts such as pollution and use of water and energy,
- Eliminate or reduce toxics that create hazards to workers and our community,
- Support strong recycling markets,
- Reduce materials that are landfilled,
- Increase the use and availability of environmentally preferable products that protect the environment,
- Identify environmentally preferable products and distribution systems,
- Reward manufacturers and vendors that reduce environmental impacts in their production and distribution systems or services, and
- Create a model for successfully purchasing environmentally preferable products that encourages the use of agricultural fibers, chlorine-free manufacturing processes, wood from sustainably harvested forests, and other environmentally friendly practices, and that encourages other purchasers in our community to adopt similar goals.

3.0 STRATEGIES FOR IMPLEMENTATION

3.1 Source Reduction

3.1.1 Institute practices that reduce waste, encourage reuse, and result in the purchase of fewer products.

3.1.2 Purchase remanufactured products such as toner cartridges, tires, furniture, equipment and automotive parts.

3.1.3 Consider short-term and long-term costs in comparing product alternatives. This includes evaluation of total costs expected during the time a product is owned, including, but not limited to, acquisition, extended warranties, operation, supplies, maintenance and replacement parts, disposal costs and expected lifetime compared to other alternatives.

3.1.4 Purchase products that are durable, long lasting, reusable or refillable and avoid purchasing one-time use or disposable products.

3.1.5 Request vendors eliminate packaging or use the minimum amount necessary for product protection. Vendors shall be encouraged to take back packaging for reuse. A vendor's willingness to take back packaging will be used as part of the consideration in the bid process.

3.1.6 Specify a preference for packaging that is reusable, recyclable or compostable, when suitable uses and programs exist.

3.1.7 Encourage vendors to take back and reuse pallets and other shipping materials.

3.1.8 Encourage suppliers of electronic equipment, including but not limited to computers, monitors, printers, and copiers, to take back equipment for reuse or environmentally sound recycling when [the Organization] discards or replaces such equipment, whenever possible. Suppliers will be required to state their take back, reuse or recycling programs during the bidding process.

3.1.9 Consider provisions in contracts with suppliers of non-electronic equipment that require suppliers to take back equipment for reuse or environmentally sound recycling when [the Organization] discards or replaces such equipment, whenever possible. Suppliers will be required to state their take back, reuse or recycling programs during the bidding process.

3.1.10 Promote electronic distribution of documents rather than printing or copying.

3.1.11 When producing paper documents, print and copy all documents on both sides to reduce the use and purchase of paper. Printers and copiers shall be set to default to duplex.

3.1.12 Reduce the number and type of equipment needed to perform office functions to save energy and reduce purchasing and maintenance costs. Eliminate desktop printers, redundant network printers and reduce the number of fax machines leased or owned by [the Organization]. Consider lease or purchase of multi-function devices.

3.1.13 Ensure all imaging equipment is installed with energy and resource-efficient settings set as default.

3.2 Recycled Content Products

3.2.1 Purchase products for which the United States Environmental Protection Agency (U.S. EPA) has established minimum recycled content standard guidelines, such as those for printing paper, office paper, janitorial paper, construction, landscaping, parks and recreation, transportation, vehicles, miscellaneous, and non-paper office products, that contain the highest post-consumer content available, but no less than the minimum recycled content standards established by the U.S. EPA Comprehensive Procurement Guidelines.

3.2.2 Purchase multi-function devices, copiers and printers compatible with the use of recycled content and remanufactured products.

3.2.3 In accordance with California Public Contract Code, Sec. 10409, purchase re-refined lubricating and industrial oil for use in its vehicles and other equipment, as long as it is certified by the American Petroleum Institute (API) as appropriate for use in such equipment. This section does not preclude the purchase of virgin-oil products for exclusive use in vehicles whose warranties expressly prohibit the use of products containing recycled oil.

3.2.4 When specifying asphalt, concrete, aggregate base or portland cement concrete for road construction projects, use recycled, reusable or reground materials.

3.2.5 Specify and purchase recycled content traffic control products, including signs, cones, parking stops, delineators, channelizers and barricades.

3.2.6 Ensure pre-printed recycled content papers intended for distribution that are purchased or produced contain a statement that the paper is recycled content and indicate the percentage of post-consumer recycled content.

3.3 Energy Efficient and Water Saving Products

3.3.1 Purchase energy-efficient equipment with the most up-to-date energy efficiency functions. This includes, but is not limited to, high efficiency space heating systems and high efficiency space cooling equipment.

3.3.2 Replace inefficient interior lighting with energy-efficient equipment.

3.3.3 Replace inefficient exterior lighting, street lighting and traffic signal lights with energy-efficient equipment. Minimize exterior lighting where possible to avoid unnecessary lighting of architectural and landscape features while providing adequate illumination for safety and accessibility.

3.3.4 Purchase U. S. EPA Energy Star certified products when available. When Energy Star labels are not available, choose energy-efficient products that are in the upper 25% of energy efficiency as designated by the Federal Energy Management Program.

3.3.5 Purchase U.S. EPA WaterSense labeled water-saving products when available. This includes, but is not limited to, high-performance fixtures like toilets, low-flow faucets and aerators, and upgraded irrigation systems.

3.4 Green Building Products and Practices

3.4.1 Consider Green Building practices for design, construction, and operation as described in the LEED Rating Systems for all building and renovations undertaken by [the Organization].

3.5 Landscaping Products and Practices

3.5.1 Employ Bay-Friendly Landscaping or sustainable landscape management techniques for all landscape renovations, construction and maintenance performed by [the Organization], including workers and contractors providing landscaping services for [the Organization], including, but not limited to, integrated pest management, grasscycling, drip irrigation, computerized central irrigation linked with the local weather station, composting, and procurement and use of mulch and compost that give preference to those produced from regionally generated plant debris and/or food scrap programs.

3.5.2 Choose a Bay-Friendly Qualified Landscape Professional for landscape design and maintenance services. Training and qualifications shall include landscaping locally, landscaping for less to the landfill, nurturing the soil, conserving water, conserving energy, protecting water and air quality, and creating wildlife habitat.

3.5.3 Select plants to minimize waste by choosing species for purchase that are appropriate to the microclimate, species that can grow to their natural

size in the space allotted them, and perennials rather than annuals for color. Native and drought-tolerant plants that require no or minimal watering once established are preferred.

3.5.4 Hardscapes and landscape structures constructed of recycled content materials are encouraged. Limit the amount of impervious surfaces in the landscape. Permeable substitutes, such as permeable asphalt or pavers, are encouraged for walkways, patios and driveways.

3.5.5 Create swales in all landscape renovations and construction performed by [the Organization] to assist in water run-off management. Develop outreach programs to instruct the public in the proper maintenance of swales.

3.6 Toxics and Pollution Prevention Products and Practices

3.6.1 Manage pest problems through prevention and physical, mechanical and biological controls when [the Organization] and its contractors maintain buildings and landscapes. The [Organization] may either adopt and implement an Organic Pest Management (OPM) policy and practices or adopt and implement an Integrated Pest Management (IPM) policy and practices using the least toxic pest control as a last resort.

3.6.2 Use products with the lowest amount of volatile organic compounds (VOCs), highest recycled content, low or no formaldehyde and no halogenated organic flame retardants when purchasing building maintenance materials such as paint, carpeting, adhesives, furniture and casework.

3.6.3 Purchase or require janitorial contractors to supply, industrial and institutional cleaning products that meet Green Seal or UL/EcoLogo certification standards for environmental preferability and performance.

3.6.4 Purchase, or require janitorial contractors to supply, vacuum cleaners that meet the requirements of the Carpet and Rug Institute Green Label/Seal of Approval Program for soil removal, dust containment and carpet fiber retention for indoor air quality protection and performance cleaning standards. Other janitorial cleaning equipment should be capable of capturing fine particulates, removing sufficient moisture so as to dry within 24 hours, operate with a sound level less than 70dBA, and use high-efficiency, low-emissions engines.

3.6.5 Purchase paper, paper products, and janitorial paper products that are unbleached or are processed without chlorine or chlorine derivatives.

3.6.6 Prohibit the purchase of products that use polyvinyl chloride (PVC) such as, but not limited to, furniture and flooring.

3.6.7 Purchase products and equipment with no lead or mercury whenever possible. For products that contain lead or mercury, [the Organization] should give preference to those products with lower quantities of these metals and to vendors with established lead and mercury recovery programs. In addition, whenever lead- or mercury-containing products require disposal, [the Organization] will dispose of those products in the most environmentally safe manner possible. All fluorescent lamps and batteries will be recycled.

3.6.8 Purchase or specify personal computers, displays, imaging equipment and televisions that meet, at a minimum, all Electronic Product Environmental Assessment Tool (EPEAT) environmental criteria designated as "required" as contained in the IEEE 1680 family of Environmental Assessment Standards.

3.6.9 Purchase or specify office furniture that meets the California Bureau of Electronic and Appliance Repair, Home Furnishings and Thermal Insulation (BEARHFTI) and Department of Consumer Affairs standard Technical Bulletin 117-2013 for testing upholstered furniture flammability without the use of flame retardant chemicals.

3.6.10 Purchase or specify commercial carpeting that meets NSF/ANSI 140 Standard for Sustainable Carpet Assessment and require old carpet that is removed be recycled.

3.6.11 Purchase or specify non-carpet floor coverings that meet NSF/ANSI 332 Standard for Resilient Flooring including vinyl, linoleum and rubber flooring.

3.6.12 When replacing vehicles, consider less-polluting alternatives to diesel such as compressed natural gas, bio-based fuels, hybrids, electric batteries, and fuel cells, as available.

3.7 Bio-Based Products

3.7.1 Encourage the use of vehicle fuels made from non-wood, plant-based contents such as vegetable oils whenever practicable.

3.7.2 Use paper, paper products and construction products made from non-wood, plant-based contents such as agricultural crops and residues.

3.7.3 Use bio-based plastic products that are biodegradable and compostable, such as bags, film, food and beverage containers, and cutlery.

3.7.4 Purchase compostable plastic products that meet American Society for Testing and Materials (ASTM) standards as found in ASTM D6400. Meet ASTM D6868 standards for biodegradable plastics used as coatings on paper and other compostable substrates.

3.7.5 Ask vendors to provide proof of compliance with ASTM standards for compostable, biodegradable and degradable plastic products upon request. One acceptable proof of compliance for compostable plastic products will be certification by the Biodegradable Products Institute (BPI).

3.8 Forest Conservation Products

3.8.1 To the greatest extent practicable, do not procure wood products such as lumber and paper that originate from forests harvested in an environmentally unsustainable manner. When possible, give preference to wood products that are certified to be sustainably harvested by a comprehensive, performance-based certification system. The certification system shall include independent third-party audits, with standards equivalent to, or stricter than, those of the Forest Stewardship Council certification.

3.8.2 Encourage the purchase or use of previously used or salvaged wood and wood products whenever practicable.

4.0 RESPONSIBILITIES

4.1 The health and safety of workers and citizens is of utmost importance and takes precedence over all other practices. Nevertheless, [the Organization] recognizes its duty to act in a fiscally responsible as well as a timely manner.

4.2 Nothing contained in this policy shall be construed as requiring a department, purchaser or contractor to procure products that do not perform adequately for their intended use, exclude adequate competition, risk the health or safety of workers and citizens, or are not available at a reasonable price in a reasonable period of time.

4.3 Nothing contained in this policy shall be construed as requiring [the Organization], department, purchaser, or contractor to take any action that conflicts with local, state or federal requirements.

4.4 [Organization] has made significant investments in developing a successful recycling system and recognizes that recycled content products are essential to the continuing viability of that recycling system and for the foundation of an environmentally sound production system. Therefore, to the greatest extent practicable, recycled content shall be included in products that also meet other specifications, such as chlorine free or bio-based.

5.0 IMPLEMENTATION

5.1 The [Director of Purchasing, Director of Finance, other responsible director] shall implement this policy in coordination with other appropriate [Organization] personnel.

5.2 Require successful bidders to certify in writing that the environmental attributes claimed in competitive bids are accurate. In compliance with State law, vendors shall be required to specify the minimum or actual percentage of recovered and post-consumer material in their products, even when such percentages are zero.

5.3 Upon request, buyers making the selection from competitive bids shall be able to provide justification for product choices that do not meet the environmentally preferable purchasing criteria in this policy.

5.4 Include businesses certified by the Bay Area Green Business Program in purchasing requests for products and services.

5.5 Encourage vendors, contractors and grantees to comply with applicable sections of this policy for products and services provided to [the Organization].

6.0 PROGRAM EVALUATION

6.1 The [Director of Finance, Director of Purchasing, other position responsible for implementing this policy] shall periodically evaluate the success of this policy's implementation and report to the [Board/Council of the Organization].

7.0 DEFINITIONS

7.1 "American Society for Testing and Materials" means ASTM International, an open forum for the development of high quality, market relevant international standards use around the globe.

7.2 "Bay Area Green Business Program" is a partnership of governments and businesses that certifies the environmental performance of government agencies and businesses.

7.3 "Bay-Friendly Landscaping" means working with the natural ecosystems of the San Francisco Bay Area to foster soil health, to reduce runoff and pollution, prevent and reuse plant waste, and conserve water and other natural resources. Bay-Friendly Landscaping practices are described in the *Bay-Friendly Landscape Guidelines*, by StopWaste.

7.4 "Bio-Based Products" means commercial or industrial products (other than food or feed) that utilize agricultural crops or residues but does not include products made from forestry materials.

7.5 "Biodegradable plastic" means the degradation of the plastic must occur as a result of the action of naturally occurring microorganisms.

7.6 "Biodegradable Products Institute" (BPI) is a multi-stakeholder association of key individuals and groups from government, industry and academia, which promotes the use, and recycling of biodegradable polymeric materials (via composting). BPI does not create standards but certifies products that demonstrate they meet the requirements in ASTM D6400 or D6868, based on testing in an approved laboratory.

7.7 "Buyer" means anyone authorized to purchase or contract for purchases on behalf of this jurisdiction or its subdivisions.

7.8 "The Carpet and Rug Institute" (CRI) is the national trade association representing the carpet and rug industry. CRI has developed and

administered the "Green Label" indoor air quality testing and labeling program for carpet, adhesives, cushion materials and vacuum cleaners. The "Green Label Plus" testing program incorporates additional requirements to meet California's Collaborative for High Performance Schools low-emitting materials criteria.

7.9 "Compostable plastic" means plastic that is biodegradable during composting to yield carbon dioxide, water and inorganic compounds and biomass, at a rate consistent with other known compostable materials and leaves no visually distinguishable or toxic residues.

7.10 "Contractor" means any person, group of persons, business, consultant, designing architect, association, partnership, corporation, supplier, vendor or other entity that has a contract with [the Organization] or serves in a subcontracting capacity with an entity having a contract with [the Organization] for the provision of goods or services.

7.11 "Degradable plastic" means plastic that undergoes significant changes in its chemical structure under specific environmental conditions.

7.12 "EcoLogo" is a third-party, multi-attribute eco-labeling program founded by the Canadian government in 1988 and part of UL Environment since 2010. The Program compares products / services with others in the same category, develops rigorous and scientifically relevant criteria, and awards the EcoLogo to those that are environmentally preferable throughout their entire lifecycle.

7.13 "Electronic Product Environmental Assessment Tool" (EPEAT) is a procurement tool to help institutional purchasers in the public and private sectors evaluate, compare and select personal computers, displays, imaging equipment and televisions based on their environmental attributes.

7.14 "Energy Star" means the U.S. EPA's energy efficiency product labeling program.

7.15 "Energy-Efficient Product" means a product that is in the upper 25% of energy efficiency for all similar products, or that is at least 10% more efficient than the minimum level that meets Federal standards.

7.16 "Federal Energy Management Program" is a program of the Department of Energy that issues a series of *Product Energy Efficiency*

Recommendations that identify recommended efficiency levels for energy-using products.

7.17 "Forest Stewardship Council" is a global organization that certifies responsible, on-the-ground forest management according to rigorous standards developed by a broad variety of stakeholder groups.

7.18 "Green Seal" is an independent, non-profit environmental labeling organization. Green Seal standards for products and services meet the U.S. EPA's criteria for third-party certifiers. The Green Seal is a registered certification mark that may appear only on certified products.

7.19 "Integrated Pest Management" is an ecosystem-based strategy that focuses on long-term prevention of pests or their damage through a combination of techniques such as biological control, habitat manipulation, modification of cultural practices, and use of resistant varieties. Pesticides are used only after monitoring indicates they are needed according to established guidelines, and treatments are made with the goal of removing only the target organism. Pest control materials are selected and applied in a manner that minimizes risks to human health, beneficial and nontarget organisms, and the environment.

7.20 "LEED Rating System" means the most recent version of the Leadership in Energy and Environmental Design (LEED) Rating System, approved by the U.S. Green Building Council, and designed for rating new and existing commercial, institutional, and residential buildings.

7.21 "NSF/ANSI" means NSF International follows the American National Standards Institute (ANSI) standards development process. Standards are developed by joint committees (balanced stakeholder groups of public health, industry and user representatives).

7.22 "Organic Pest Management" prohibits the use and application of toxic chemical pesticides and strives to prevent pest problems through the application of natural, organic horticultural and maintenance practices. All pest control products shall be in keeping with, but not limited to, those products on the approved list of California Certified Organic Farmers (CCOF).

7.23 "Post-consumer Material" means a finished material which would normally be disposed of as a solid waste, having reached its intended

end-use and completed its life cycle as a consumer item, and does not include manufacturing or converting wastes.

7.24 "Pre-consumer Material" means material or by-products generated after manufacture of a product is completed but before the product reaches the end-use consumer. Pre-consumer material does not include mill and manufacturing trim, scrap, or broke which is generated at a manufacturing site and commonly reused on-site in the same or another manufacturing process.

7.25 "Recovered Material" means fragments of products or finished products of a manufacturing process, which has converted a resource into a commodity of real economic value, and includes pre-consumer and post-consumer material but does not include excess resources of the manufacturing process.

7.26 "Recycled Content" means the percentage of recovered material, including pre-consumer and post-consumer materials, in a product.

7.27 "Recycled Content Standard" means the minimum level of recovered material and/or post-consumer material necessary for products to qualify as "recycled products."

7.28 "Recycled Product" means a product that meets [the Organization's] recycled content policy objectives for post-consumer and recovered material.

7.29 "Remanufactured Product" means any product diverted from the supply of discarded materials by refurbishing and marketing said product without substantial change to its original form.

7.30 "Reused Product" means any product designed to be used many times for the same or other purposes without additional processing except for specific requirements such as cleaning, painting or minor repairs.

7.31 "Source Reduction" refers to products that result in a net reduction in the generation of waste compared to their previous or alternate version and includes durable, reusable and remanufactured products; products with no, or reduced, toxic constituents; and products marketed with no, or reduced, packaging.

7.32 "U.S. EPA Guidelines" means the Comprehensive Procurement Guidelines established by the U.S. Environmental Protection Agency for federal agency purchases as of October 2007 and any subsequent versions adopted.

7.33 "Water-Saving Products" are those that are in the upper 25% of water conservation for all similar products, or at least 10% more water-conserving than the minimum level that meets the Federal standards.

7.34 "WaterSense" means a partnership program by the U.S. Environmental Protection Agency. Independent, third-party licensed certifying bodies certify that products meet EPA criteria for water efficiency and performance by following testing and certification protocols specific to each product category. Products that are certified to meet EPA specifications are allowed to bear the WaterSense label.

8.0 EFFECTIVE DATES

8.1 This policy shall take effect on [date].

APPENDIX E. WASTE AUDITS/SORTS

Overview

Waste Audits can provide better understanding of the materials which are in the trash, and determining the types of materials available for recovery. Published reports (or secondary data sources) for material-specific generation estimates are useful, but may not be entirely applicable to a given institution or business. Conducting one or more waste audits very early during initial plan implementation is strongly recommended, and should provide valuable information regarding the amount and types of materials in the waste stream. Such information is critical in designing appropriate recycling and waste diversion programs.

In a school or university setting, students could be recruited to conduct the waste audits, with supervision provided from green team members. Waste audits or waste assessments generally encompass a number of possible activities which can be used to characterize and better understand your wastes. These activities include:

- Examining available records
- Conducting a facility walk-through and observing relevant information related to waste generation
- Performing a waste sort

Each of these methods can be valuable.

A waste sort should be conducted in high-visibility areas so students can view the process and ask questions. As a result, these activities can be useful as an awareness tool, as well as a planning tool to determine which recyclable materials are being disposed or which buildings may benefit from more education regarding proper placement of refuse and recyclables containers, as well as delivery to the loading dock for pickup. The findings from waste sorts should be publicized through means such as a posting in the student/local paper, and by creating a display for the campus library or frequently visited buildings which illustrate the sorting results.

Resources for Conducting a Waste Audit/Waste Sort

Many resources are available to assist the school in designing and conducting a waste audit (or waste assessment).

U.S. Environmental Protection Agency. U.S. EPA has developed a toolkit entitled, "Tools to Reduce Waste in Schools: Reuse, Recycle, Buy-Recycled" which includes information regarding waste audits, as well as other useful information. This document can be found by pasting the title into a web browser and searching for it.

More specific information on conducting a waste audit can be found at:

https://www.epa.gov/smm/best-practices-wastewise-participants#01

Digging Deep Through School Trash. This is a document published by the Minnesota Pollution Control Agency, and provides excellent information on planning and conducting a waste sort. The report also includes other information which should be useful in moving towards zero waste.

http://www.pca.state.mn.us/index.php/view-document.html?gid=14235

Solid Waste Authority of Central Ohio (SWACO). SWACO's website contains information useful for institutions and businesses considering implementing a waste assessment:

https://www.swaco.org/184/Waste-Audits-Assessments

Health and Safety Plan (HASP)

Although conducting a waste sort at a school should present much fewer concerns than doing so at a solid waste facility, having a health and safety plan for a school waste sort is a good idea. Extracting relevant sections from the following plan could be useful in developing a HASP.

HEALTH AND SAFETY PLAN FOR THE WASTE CHARACTERIZATION STUDY

EMERGENCY PHONE NUMBERS

Fire, First Aid, Ambulance, Police: **911**
Hospital Nearest to XYZ Landfill:
Doctors Hospital: **614-544-1000**

FIELD RESPONSIBILITY:

John Doe, Project Manager:
123-555-0138

ABC High School Principal:
123-555-5100

A copy of this Health and Safety Plan must be kept at the site during all field activities.

Health and Safety Plan

ABC High School is committed to providing a safe and healthy project environment and ensuring that project participants are safe when conducting waste sorting or assessment activities. ABC High School has developed this Health and Safety Plan (HASP) to be used by staff and project participants performing waste sorting activities on site where hazards may exist.

This Health and Safety Plan (HASP) was developed for project participants performing the Waste Characterization Study. The purpose of the HASP is to inform project participants of potential health and safety hazards that may be encountered during the waste sort. It was prepared with the best available information regarding physical and chemical hazards. While it is not possible to discover, evaluate, and protect in advance against all possible hazards, which may be encountered during the completion of this study, adherence to the requirements and recommendations in the HASP will significantly reduce the potential for injury.

PROPOSED SCOPE OF WORK

- Select samples of waste to be sorted and transport waste from designated collection area to designated sorting area.
- Manually sort waste into designated material categories.

- Weigh bins of sorted materials on a scale.
- Return sorted waste to designated collection area.

RESPONSIBLE INDIVIDUALS

Safety during the waste sort will be the responsibility of the Project Manager. The Project Manager may temporarily suspend activities on site if there appears to be a threat to health and safety. Other health and safety-related responsibilities of the Project Manager are described below.

The Project Manager will primarily be responsible for:

- Assuring project participants have access to the appropriate protective equipment and that the protective equipment is being properly utilized.
- Assuring that project participants are aware of the safety procedures outlined in the HASP and understand the potential hazards associated with activities at the site.
- Supervising the project participants' adherence to health and safety protocol and correcting conditions that could result in injury or exposure to hazardous substances.

SCOPE AND APPLICABILITY

A copy of this health and safety plan must be kept at the site during field activities.

The provisions in this plan are mandatory for the project participants, which includes students and staff involved with the hands-on sorting activities.

Prior to conducting field work, individuals who will be performing field work must read this Health and Safety Plan. If any information presented in the plan is unclear, the reader will contact the Project Manager for clarification. When all of the information has been read and understood, the individual will sign a copy of the acknowledgement shown on the following page.

ACKNOWLEDGEMENT OF RECEIPT, HEALTH AND SAFETY PLAN

Confirmation of Notification

HEALTH AND SAFETY PLAN FROM THE WASTE CHARACTERIZATION STUDY

As a project participant, I have read the Health and Safety Plan (HASP). I hereby acknowledge that I understand the contents of this plan and that I will use personal protective equipment and follow procedure specified in the HASP. I confirm that I will provide and use appropriate footwear during field activities. Appropriate footwear is defined as hard-soled, non-slip, steel toe boots.

I understand that ABC High School will provide:

- Hard hats
- Safety glasses
- Gloves (inner liner: nitrile; outer: latex-coated Kevlar)
- Safety vest
- Polypropylene suits
- Ear plugs
- Dust mask

The aforementioned safety items provided by ABC High School must be used during sorting activities. **I understand that all safety regulations must be observed and violations of safety rules or use of safety equipment is grounds for dismissal from the project.**

_____ _____

Signature Date

EMERGENCY INFORMATION

Emergency telephone numbers for reporting an emergency are listed on the cover of this Plan.

ACCIDENTS/INJURIES

Depending on the severity of an injury, treatment may be given at the site by trained personnel or emergency medical technicians, or the victim may be transported to a hospital. The address and phone number of the nearest hospital is below:

ABC High School:
Doctors Hospital
5100 West Broad St.
Any City, Ohio 12345
123-55-1000

FIRE

The potential for fire exists at this site. The use of lighters, matches, or any other devices which may produce a flame or spark will be prohibited by project participants while on site.

EVACUATION

The Project Manager is responsible for judging if circumstances require members of the project team to evacuate an area during field activities. Specific evacuation procedures will be covered on the first day at the site prior to beginning field work. Project participants will comply with evacuation procedures as defined by the Project Manager.

ACCIDENT/INCIDENT REPORTING

If an accident or incident develops at the site, the first responder should take the following course of action:

- Contact the appropriate emergency service for assistance.
- Contact the Project Manager.
- Provide an incident report to the Project Manager.

ACCIDENT/INCIDENT REPORT FORMAT

In the event of an accident or incident, the first responder should provide the following details related to the event to the Project Manager:

- Name and contact number of person(s) reporting
- Location of accident/incident
- Casualties (i.e. fatalities, disabling injuries)
- Summary of accident/incident, including date and time
- Suspected/known cause(s) of accident/incident

GENERAL FIELD SAFETY PROCEDURES

Safety is the responsibility of all members of the Project Team in performing field activities. Following the procedures in this Plan will minimize the risk of injuries and accidents. Anticipated hazards while conducting field activities include, but are not limited to:

- Sharp objects, such as nails, razor blades, needles, and broken glass
- Projectiles caused from the unloading of waste from containers that can burst under pressure
- Potentially infectious bodily fluids on tissues, napkins, or other waste
- Fire or explosion caused by the ignition of methane gas or other chemicals
- Animal or insect bites
- Site physical hazards such as uneven terrain caused by debris and water hazards

SAFETY EQUIPMENT

Project participants must use the following personal protective equipment during field activities. ABC High School will provide:

- Safety glasses
- Gloves (inner: nitrile; outer: latex-coated kevlar)
- Tyvek suit
- Dust mask

Each project participant will provide and use appropriate footwear during field activities. Appropriate footwear is defined as hard-soled, non-slip, steel toe boots. Individuals will also bring sufficient water for personal use to the site each day.

SITE STAND OPERATING PROCEDURES

Project participants will conduct themselves in a professional manner at all times. The following restrictions will also be observed by all project participants performing field activities:

- Working while under the influence of intoxicants including prescribed medication is prohibited

- The use devices that can produce a flame or spark anywhere on site are prohibited
- During sorting, materials should be brushed aside rather than projecting hands into a bag or pile of materials to minimize the risk of cuts or punctures from sharp objects
- Loose clothing will not be worn on-site. Long hair must be tied back.
- Eating, drinking, and chewing gum, or any activity that increases the probability of hand-to-mouth transfer and ingestion of material during field activities is prohibited
- Project participants not be admitted to the site without the proper safety equipment
- All staff and other students must adhere to the established safety procedures at the activity site.
- Contact with contaminated or potentially contaminated material should be avoided. Whenever possible, do not walk through un-solid materials including liquids or mud. Do not sit or kneel on the ground.
- If food or water is consumed at the site, it should only be consumed in a designated area after the decontamination procedure has been completed.
- Project participants must notify Project Manager if animals or insects that pose a threat to health and safety are discovered. The Project Manager will instruct project participants of the appropriate course of action.
- Any medical emergency supersedes routine safety requirements.

On the first day of the project, project participants will review the location of the water supply, extra safety equipment, and telephones, as well as existing health and safety protocol, including evacuation procedures.

Each day before beginning sorting activities, the Project Manager will review that each member of the Project Team is wearing appropriate safety gear as prescribed in this Plan. At this time, equipment will be reviewed for any tears or malfunctions.

During field activities, all project participants will wipe off unknown or hazardous residues immediately. If personal protective equipment becomes damaged during field activities, it will be repaired or replaced immediately.

Project participants experiencing any physical discomfort, abnormalities, fatigue, or lightheadedness will immediately stop work, notify the Project Manager, and leave the area with an escort.

HOUSEKEEPING

Work areas will be kept clean and orderly at all times. Project participants should remove any tripping hazards from the immediate work area. Slipping hazards must be wiped up immediately from the sorting area.

DECONTAMINATION

The risks of illness due to ingesting hazardous, toxic, diseased, or decomposed materials from the work site are significant. To minimize these risks, project participants should remove and store the outer layers of their personal protective equipment (i.e., polypropylene suits, gloves, hard hat, and dust mask) on-site. Hands, face, and nails should be thoroughly washed or scrubbed with hot water and soap prior to engaging in any activity likely to transmit materials encountered on-site into the mouth.

APPENDIX F. MANAGEMENT OF SPECIAL WASTES

Materials such as computers, TVs, fluorescent bulbs, and ballasts represent challenges for recycling and proper management.

1. Electronics

Electronic waste, or e-waste, describes a waste stream that includes computers, monitors, keyboards, radios, televisions, VCRs, DVD/CD players, speakers, typewriters, fax machines, telephones/cell phones, 2-way radios, answering machines, scanners, microwaves, and other devices/accessories. E-waste contains valuable metals like gold, silver, and copper that can be reclaimed and recycled. E-waste also contains elements and compounds such as cadmium, hexavalent chromium, mercury, chromium, barium, and beryllium that are harmful to human health and the environment if they are not properly disposed or recycled.

Donating used electronics for reuse is an option for reducing the total e-waste generated. When devices reach the end of their lifespan and must be disposed or recycled, many electronics manufacturers and retailers offer take back programs. In Franklin County, SWACO created the E-Waste Diversion Program to collect and recycle old, unwanted e-waste in an environmentally-responsible manner. Services through this program provided are divided into two categories:

- "Collection of e-waste generated on site, owned by the entity or collected through a permanent drop-off. Services are provided on a pickup basis.
- Collection of e-waste from the public through a mobile collection event held by the community, school district, or government agency. The mobile collection event is held on a specific day and time and collection is managed by the contractor." [from SWACO's website]

Additional information regarding SWACO's program can be found at:

http://oh-swaco.civicplus.com/187/E-Waste-Diversion-Program

Electronics that will normally be accepted include: computers, monitors, printers, scanners, copiers, phones, fax machines, servers, circuit boards, TVs, laptops, cell phones, VCRs, keyboards and mice. Currently, there are two accredited certification standards for electronics recyclers: the Responsible Recycling Practices (R2) and the e-Stewards® standards. When selecting an electronics recycler, the U.S. EPA encourages customers to choose certified electronics recyclers.

2. Fluorescent Bulbs and Ballasts

Mercury lamps use 75% less energy than incandescent lighting and last approximately 10 times longer (Control, 2014). Mercury lamps reduce waste generation and improve energy efficiency when compared to alternative lighting options, making them a popular choice for commercial and institutional facilities. Purchasing lamps or tubes with a long lamp life (minimum of 20,000 hours of rated life) may minimize the quantity of fluorescent lamp and tube waste generated.

Businesses and institutions that generate mercury containing bulbs are not permitted under Ohio law to dispose of the material in landfills. When mercury-containing bulbs or tubes become damaged, mercury vapors can be released to the air, absorbed through the lungs into the bloodstream, or washed by rainwater into waterways. Improper disposal of lamps or tubes poses risks to human and environmental health. Recycling lamps prevents mercury from being released into the environment, as well as captures the mercury for reuse. Many other components from lamps can be recycled as well, including the metal end caps, glass, and phosphor powder.

Ballasts are often used in commercial or industrial lighting systems. Ballasts can contain hazardous and carcinogenic materials (polychlorinated bi-phenyls or PCBs). Precious metals and materials can be reclaimed from spent ballasts and recycled. Both lamps and ballasts are considered Universal Wastes, which are specific hazardous waste streams that a generator can choose to manage in an alternative manner in place of the more complex hazardous waste requirements. Universal Waste Rules (UWR) are intended to promote recycling as well as proper disposal by easing certain regulatory requirements.

Bulbs and ballasts are most commonly recycled by scheduling a bulk recycling pickup from a special waste processor, or by using a prepaid recycling kit. Kits include an addressed collection container with prepaid shipping. When collection containers become full, customers call a shipping company such as FedEx to pick up the shipping container and transport it to a special waste recycling center.

A list of companies in Ohio that recycle mercury-containing lamps and ballasts can be found in on Ohio EPA's website at:

http://epa.ohio.gov/portals/32/pdf/comp.lamp.ballast.list.pdf

3. Chemistry Lab Wastes

Most glass and plastic chemical bottles generated in a lab can be recycled with regular recyclables by triple rinsing and removing the labels. Bottles containing Hazardous or P-Listed materials should be treated as hazardous waste.

Lab equipment and supply vendors offer take-back programs and will take back specialized packaging for reuse. The following major lab suppliers offer take-back programs:

Company	VWR	Corning	USA Scientific
Materials	*Pipette tip boxes*	*Pipette tip boxes, plastic serological pipette wraps, centrifuge tube racks/bags*	*Pipette tip boxes, plastic serological pipette wraps, centrifuge tube racks/bags*
Contact	Maddy Eibner-Siwek	Pam Murtagh	Joe Marinaro
Phone	800-932-5000	800-492-1119 Ext. 8048	800-872-3847 Ext. 518
Email	maddy_eibner-siwek@vwr.com	murtaghpa@corning.com	jmarinaro@usascientific.com
Website	www.vwr.com	www.corning.com/lifesciences	www.usascientific.com

Many types of glass waste generated in a lab cannot be recycled with general glass recycling from other non-lab areas. Unlike beverage and food containers, many lab glasses, such as beakers and test tubes made from Pyrex, are heat resistant and cannot be recycled with conventional glass containers. Uncontaminated beakers, test tubes, bottles, flasks, jugs, and vessels of any color or heat resistance can, however, be diverted from the waste stream. Heat resistant glass can be ground up and used in for a variety of purposes, such as aggregate, paving applications or as an additive in reflective paints.

Granite Express (480-354-6809) in Mesa, Arizona crushes and tumbles pyrex then adds the glass to a porous pavement material called FilterPave. The pavement filters storm water and keeps pollutants from entering municipal storm water runoff systems. Dust and flecks of glass that crush to sizes smaller than 1/16" are used in reflective paints.

If the laboratory generates sharp waste such as glass septum vials, reagent bottles, capillary tubes, or Pasteur pipettes, using a reusable sharps container reduces the waste generated by collecting wastes in disposal sharps containers.

The University of Florida developed a hazardous waste minimization guide that discusses strategies for source reduction, recycling, and treating hazardous wastes. It is available at:

http://webfiles.ehs.ufl.edu/ChemWasteMgtGuide.pdf

Selecting a sustainable special waste management company to handle laboratory waste is another option for minimizing laboratory waste. Choose a company that offers recycling, recovery, landfill diversion and alternative beneficial reuse solutions for special wastes.

Pollution Prevention and Waste Minimization in Laboratories, by Peter A. Reinhardt is another excellent resource available to manage laboratory wastes. Some information from this document includes:

101 Ways to Reduce Hazardous Waste in the Laboratory

1. Write a waste management/reduction policy.
2. Include waste reduction as part of student/employee training.
3. Use manuals such as the American Chemical Society's (ACS) "Less is Better" or "ACS Waste Management Manual for Laboratory Personnel" as part of your training.
4. Create an incentive program for waste reduction.
5. Centralize purchasing of chemicals through one person in the laboratory.
6. Inventory chemicals at least once a year.
7. Indicate in the inventory where chemicals are located.
8. Update inventory when chemicals are purchased or used up.
9. Purchase chemicals in smallest quantities needed.
10. If trying out a new procedure, try to obtain the chemicals needed from another laboratory or purchase small amounts initially. After you know you will be using more of these chemicals, purchase in larger quantities (unless you can obtain excess chemicals from someone else).
11. Date chemical containers when received so that older ones will be used first.
12. Audit your laboratory for waste generated (quantity, type, source, and frequency).
13. Keep MSDSs for chemicals used on file.
14. Keep information about disposal procedures for chemical waste in your laboratory on file.
15. If possible, establish an area for central storage of chemicals.
16. Keep chemicals in your storage area except when in use.
17. Establish an area for storing chemical waste.
18. Minimize the amount of waste kept in storage.
19. Label all chemical containers as to their content (even those with only water).

20. Develop procedures to prevent and/or contain chemical spills–purchase spill cleanup kits, contain areas where spills are likely to occur.
21. Keep halogenated solvents separate from non-halogenated solvents.
22. Keep recyclable waste/excess chemicals separate from non-recyclables.
23. Keep organic wastes separate from metal-containing or inorganic wastes.
24. Keep nonhazardous chemical wastes separate from hazardous waste.
25. Keep highly toxic wastes (cyanides, etc.) separated from the previous groups.
26. Avoid experiments that produce wastes that contain combinations of radioactive, biological and/ or hazardous chemical waste.
27. Keep chemical wastes separate from normal trash (paper, wood, etc.).
28. Use the least hazardous cleaning method for glassware. Use detergents such as Alconox, Micro, RBS35 on dirty equipment before using KOH/ethanol bath, acid bath or No Chromix.
29. Eliminate the use of chromic acid cleaning solutions altogether.
30. Eliminate the use of uranium and thorium compounds (naturally radioactive).
31. Substitute red liquid (spirit-filled), digital, or thermocouple thermometers for mercury thermometers where possible.
32. Use a bimetal or stainless-steel thermometer instead of mercury thermometer in heating and cooling units. Stainless steel laboratory thermometers may be an alternative to mercury thermometers in laboratories, as well.
33. Evaluate laboratory procedures to see if less hazardous or nonhazardous reagents could be used.
34. Review the use of highly toxic, reactive, carcinogenic or mutagenic materials to determine if safer alternatives are feasible.
35. Avoid the use of reagents containing: arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver. Consider the quantity and type of waste produced when purchasing new equipment
37. Purchase equipment that enables the use of procedures that produce less waste.
38. Review your procedures regularly (e.g., annually) to see if quantities of chemicals and/or chemical waste could be reduced.
39. Look into the possibility of including detoxification and/or neutralization steps in laboratory experiments.
40. When preparing a new protocol, consider the kinds and amounts of waste products and determine whether they can be reduced or eliminated.
41. When researching a new or alternative procedure, include consideration of the amount of waste produced as a factor.
42. Examine your waste/excess chemicals to determine if there are other uses in your laboratory. Neighboring laboratories, departments or non-laboratory areas (garage, paint shop, art department) might be able to use them.

43. Review the Chemical Exchange inventory on http://ehs.utk.edu/pdf/cei.pdf to review the list of chemicals that EHS has stored under the Chemical Exchange program.
44. Contact EHS if you have unused chemicals to add to the Chemical Exchange program, or if you would like to obtain a chemical from the exchange.
45. Call the chemical recycling coordinator to discuss setting up a locker or shelf for excess chemical exchange in a laboratory, stockroom or hallway in your department.
46. When solvent is used for cleaning purposes, use contaminated solvent for initial cleaning and fresh solvent for final cleaning.
47. Try using detergent and hot water for cleaning of parts instead of solvents.
48. Consider using ozone treatment for cleaning of parts.
49. Consider purchasing a vapor degreaser, vacuum bake or bead blaster for cleaning of parts.
50. Reuse acid mixtures for electropolishing.
51. When cleaning substrates or other materials by dipping, process multiple items in one day.
52. Use the smallest container possible for dipping or for holding photographic chemicals.
53. Store and reuse developer in photo laboratories.
54. Precipitate silver out of photographic solutions for reclamation.
55. Neutralize corrosive wastes that don't contain metals at the laboratory bench.
56. Deactivate highly reactive chemicals in the hood.
57. Evaluate the possibility of redistillation of waste solvents in your laboratory.
58. Evaluate other wastes for reclamation in your laboratory.
59. Scale down experiments producing hazardous waste wherever possible.
60. In teaching laboratories, consider the use of microscale experiments.
61. In teaching laboratories, use demonstrations or video presentations as a substitute for some student experiments that generate chemical wastes.
62. Use pre-weighed or pre-measured reagent packets for introductory teaching laboratories where waste is high.
63. Include waste management as part of the pre- and post-laboratory written student experience.
64. Encourage orderly and tidy behavior in laboratory.

65. Use the following substitutions where possible:

Original Material	Substitute	Comments
66. Acetamide	Stearic Acid	In phase change and freezing point depression
67. Benzene	Alcohol	
68. Benzoyl Peroxide	Lauryl Peroxide	When used as a polymer catalyst
69. Carbon Tetrachloride	Cyclohexane	In test for halide ions
70. Chloroform	1,1,1-trichloroethane	
71. Chromic Acid cleaning solutions	Alconox, Micro, Pierce RBS-35, or similar detergents	In glassware cleaning
72. Formaldehyde; Formalin	"Formalternate" or Ethanol	For storage of biological specimens
73. Halogenated Solvents	Non-Halogenated Solvents	In parts washers and other solvent processes
74. Mercuric Chloride Reagent	Amitrole (Kepro Circuit Systems)	Circuit Board Etching
75. Mercury Salts	Mercury-free catalysts (Copper Sulfate, Potassium Sulfate, Titanium Dioxide)	Kjeldahl digests
76. Mercury Thermometers	Mineral Spirit dilled, stainless steel, bimetal, digital	
77. Mercuric Chloride (biocide)	5-10% Methylene Chloride, 1% Formalin; 1 N Hydrochloric acid, Sodium Hypochlorite	
78. Sodium Dichromate	Sodium Hypochlorite	
79. Sulfide Ion	Hydroxide Ion	In analysis of Heavy Metals
80. Wood's Metal	Onion's Fusible Alloy	
81. Xylene or Toluene	Simple Alcohols and Ketones	
82. Xylene or Toluene	Non-Hazardous Proprietary Liquid scintillation	In radioactive tracer studies
83. Scintillation Vials	Cocktails	

84. Use best geometry of substrate carriers to conserve chemicals.
85. Polymerize epoxy waste to a safe solid.
86. Consider using solid phase extractions for organics.
87. Put your hexane through the rotavap for reuse.
88. Destroy ethidium bromide using household bleach.
89. Run mini SDS-PAGE 2d gels instead of full-size slabs.
90. Treat sulfur and phosphorus wastes with bleach before disposal.
91. Treat organolithium waste with water or ethanol.
92. Seek alternatives to phenol extractions (e.g., small scale plasmid prep using no phenol may be found in Biotechnica, Vol. 9, No. 6, pp. 676-678).
93. Collect metallic mercury for reclamation.
94. Investigate possibility for recovering mercury from mercury containing solutions.
95. Recover silver from silver chloride residue waste and gold from gold solutions.
96. Purchase compressed gas cylinders, including lecture bottles, only from manufacturers who will accept the empty cylinders back.
97. When testing experimental products for private companies, limit donations to the amount needed for research.
98. Return excess pesticides to the distributor.
99. Be wary of chemicals donations from outside the University. Accept chemicals only if you will use them within 12 months.
100. Replace and dispose of items containing polychlorinated biphenyls (PCBs).
101. Send us other suggestions for waste reduction by campus mail or email to: Environmental Health and Safety, 916 22nd Street, or safety@utk.edu.

Source: *Pollution Prevention and Waste Minimization in Laboratories*, by Peter A. Reinhardt, K. Leigh Leonard and Peter C. Ashbrook

Inform is an organization whose website contains a number of factsheets which address environmental issues, including suggestions for alternatives to avoid the use of products containing mercury.

http://www.informinc.org/pages/research/chemical-hazards-prevention/fact-sheets.html

APPENDIX G. REUSE AND SOURCE REDUCTION PROGRAMS

In general, all institutions generate waste which is not recyclable or compostable. The same is true for some businesses. The options available for these materials in terms of management are reuse and/or reduction of generation through substitution or simply less consumption. Developing viable reuse and reduction strategies are vitally important for reaching ambitious diversion goals.

1. Reuse Strategies

Reuse is an important component of achieving zero waste. The benefits of reusing materials and products are numerous and include (but are not limited to):

- Pollution prevention from avoided manufacturing of new products or raw materials extraction;
- Energy conservation from avoided manufacturing, transportation, and disposal of products;
- Natural resource conservation; and
- Extending the useful life of materials or products.

There are a variety of opportunities for faculty, staff, students, parents, and businesses to participate in reuse activities, and can provide an excellent method of emphasizing the importance of an environmental ethic. Reuse/donation drives can be held on a one-time, seasonal, or ongoing basis. Common items collected for reuse can include clothing, books, toys, functional electronic equipment, art/office supplies, athletic equipment, home goods (blankets, towels, small kitchen appliances, serving utensils/dishes/cups, décor), and non-perishable food items. The length of the collection period may be limited by the storage space available for donated items. Options for implementing a reuse program include:

- Free-store: Students/faculty/staff may take items for no cost. In schools, “free-stores” work well when items such as school supplies and books are collected. These items typically do not require much room for collection. A bookshelf can be used to collect items, as well as display which items are available.

- Donating collected materials to a library, shelter, or non-profit organization: Selecting a specific beneficiary to receive reusable items will help to narrow the list of materials that will be accepted by the reuse program. Many non-profit organizations will assist with transportation of collected items if a substantial amount has been collected.

Other suggestions for reducing waste by reusing materials include:

- Encouraging students, faculty, and staff to use reusable containers and utensils for food and beverages instead of purchasing or packing items in single use containers;
- Purchasing reusable printer and toner cartridges and rechargeable batteries;
- Using one sided-printed paper for scrap paper or note taking; and
- Purchasing refillable spray bottles instead of aerosol cans for custodial staff.

Finally, if a material cannot be reused or reducing its generation is not a feasible alternative, look for substitutes which can be recycled or reused. Most materials have viable substitutes, even though the costs may be somewhat higher.

2. Reuse through the Ohio Materials Management Marketplace

In the spring of 2017, Ohio EPA launched a new online platform whereby Ohio businesses, not-for-profits and government organizations can advertise and acquire scrap and by-product materials that might otherwise be destined for disposal in landfills. The new Ohio Materials Marketplace is a free online platform allowing organizations to connect and find solutions to material reuse and recycling needs.

Examples of materials posted on the marketplace (and their potential re-uses) include common items such as bulk wooden pallets (mulch base) or used bricks (building materials). Along with browsing for materials, users of the marketplace can post "wanted" items, thereby, seeking items that may serve as substitutes for raw materials or other items they currently purchase. From the marketplace's website:

> "The Ohio Materials Marketplace aims to create a closed-loop, collaborative network of businesses, organizations and entrepreneurs where one organization's hard-to-recycle wastes and by-products becomes another organization's raw material."

The link to the marketplace is as follows:

https://ohio.materialsmarketplace.org/

3. Source Reduction Strategies

Source reduction eliminates or reduces waste before it is generated. Waste can be reduced at the source by eliminating a waste stream (like unwanted junk mail) or reducing the consumption of materials (like using less paper).

Reducing paper and ink usage:

In addition to reduced font size, margin size, and double-siding documents, selecting ink-saving fonts can also help with reducing waste generation via source reduction. Ecofont is a font designed to use up to 20% less ink than traditional fonts. The font saves ink by eliminating the use of ink in small circles inside each letter. Circles are not distinguishable in printed fonts sized 9 through 11. A free version of Ecofont Sans may be downloaded at the following website:

www.ecofont.com/en/products/green/font/download-the-ink-saving-font.html

Additional fonts (Arial, Times New Roman, Calibri, Verdana, and Trebuchet MS) may be purchased.

Changing policies and procedures can also reduce the amount of paper and ink consumed. Examples include:

- Posting information online, or sending information to students or parents electronically through email or SMS messaging instead of distributing printed materials.
- Consider having homework turned in on a flash drive or emailed instead of printing physical copies.
- Use inter-office envelopes when envelopes are needed for internal use.
- Use electronic letterhead rather than pre-printed.
- If electronic communication is not an option, use bulletin boards when possible to distribute information rather than making multiple copies.

Other source reduction suggestions include:

- Purchasing more durable or reusable equipment;
- Purchasing products with minimal packaging and/or packaging that is recyclable;
- Buying products in concentrate or bulk form; and
- Consolidating partially full bags of trash or recyclables so liners can be reused when possible.

APPENDIX H. DATA COLLECTION AND MANAGEMENT

Overview

Institutions and businesses should develop a comprehensive data collection program in order to track the amounts and types of materials disposed, recycled, and reused from each program. This information is important for measuring the success of existing programs, making any necessary adjustments, and adding new programs. Re-TRAC Connect is a free online application that allows users to enter, store, track, and analyze disposal and waste diversion data. Re-TRAC Connect is more user-friendly than Excel and can be customized to track only the waste streams generated at the using the free Tracker Light tool.

Re-TRAC Connect accounts are multi-functional and can be used to join and participate in state, regional, and national programs such as Keep America Beautiful's Great American Cleanup or the U.S. EPA's WasteWise program. Re-TRAC Connect users also have access to exclusive articles and other waste reduction resources.

Data tracking and management should include exploring methodologies to measure the amount of source reduction and reuse.

Obtaining accurate measurements of the amount of waste reduction and recycling and waste generation is important throughout ZWP implementation. However, this information is perhaps even more crucial during the initial stage of the ZWP because the decisions made with regard to the appropriate types of programs, technologies used, and sizes of equipment will be determined, at least in part, with this data. The institution or business should purchase a scale which can be used to weigh each bag of trash, container of recyclables, and waste from the cafeteria before being dumped into the dumpsters behind the building. If janitorial staff do not have enough time to weigh each bag and container, volunteers should be employed for this task and record the results. Information for scales including the approximate cost can be found at the end of this appendix.

In addition to weighing the trash and recyclables, someone should have the responsibility to visually inspect the dumpsters immediately prior to the dumpsters being emptied (or after the last addition of materials to the dumpster and prior to emptying). For each dumpster, the following information should be estimated and recorded:

- Percentage of capacity used
- Amount of materials on the ground
- Degree of contamination in the recycling dumpsters and recyclables visible in the trash dumpster.

This information can be used to determine the appropriate size and level of service for the dumpsters. Also, it may indicate the need for focused educational efforts within the school if, for instance, the inspections suggest an unusually high degree of a particular type of recyclable material routinely showing up in the trash dumpster.

Custodial staff or volunteers should break-down all cardboard boxes before being placed in (or on) the mixed recyclables dumpsters. By doing so, the institution or business will be able to utilize the capacity of the dumpster much more efficiently.

Scales

The scale that GT Environmental has used for waste audits is a Mettler-Toledo shipping scale with a 400 lb. capacity, and precision to 0.2 pounds. Pictures of this scale are below.

Other available scales can be found at:
http://scales-4-less.com/acatalog/Shipping__Scales.html

Jennings JShip 332 lb.: Shipping Scale – 332 lb. capacity and up to 0.2 lb. readability. Large 15" x 12" stainless steel platform, remote mountable display, AC power adapter, 20 year warranty. **Price: $66.50**

DW-63 DigiWeigh: Professional shipping scale – 400 lb. capacity and up to 0.1 lb. readability. **Price: $91.00**

APPENDIX I. GREEN TEAM ESTABLISHMENT AND LEADERSHIP

The information in this appendix is generally applicable to a school or university, but could also be adapted for other institutions and businesses. Members of a Green Team for a school or university could include:

- One or two students from each grade level as members
- At least two faculty members
- A representative of the custodial staff or facilities management
- A volunteer from a local Kiwanis, Lions Club, or other service club, or a retiree to aid with leading ZW efforts
- A Board of Trustees Member or member of the administration

Green Team membership could also include representatives from businesses located nearby, and/or organizations which might have an interest and "stake" in the activities associated with the Green Team. Examples of these types of organizations are the Solid Waste Authority of Central Ohio, the local Lions Club, or City of Bexley officials.

General objectives should include overseeing the implementation of sustainability projects, development of new ideas for waste reduction, recycling, and educational efforts. The Green Team will guide the implementation of projects, assess the results of programs, recommend changes to programs, and oversee all aspects of waste reduction and diversion.

The Green Team should meet on a regular schedule, with a written agenda prepared for each meeting. Agendas could include periodic presentations from students within the school or individuals invited from solid waste management companies, etc.

Leadership within the Green Team is vitally important in order to provide oversight and follow-through for project implementation. This person (or persons) should have skills in managing people, getting tasks accomplished on a timely basis, and ideally would have a commitment to and knowledge of sustainability. If a faculty member serves in this capacity, school administrators must allow the necessary time for this teacher to accomplish the leadership responsibilities. An alternative to having a teacher assigned as the leader or chairperson could involve exploring the possibility of having a volunteer from outside the school or university serve in the leadership role.

The Green Team should consider having a student as the co-chair of the committee. Involving a student co-chair in the leadership of the Green Team could provide a valuable learning experience.

The Green Team should consider the formation of subcommittees, as needed, which would be responsible for the details associated with the implementation of various programs. For example, one subcommittee might be the "Recycling Container" subcommittee. Responsibilities for this committee could include:

- Placement of all recycling containers
- Labeling for containers
- Ensuring that containers are maintained in all assigned locations
- Monitoring use of containers and noting problems which may arise

Each subcommittee would be required to report to the full Green Team at scheduled meetings, and provide any recommendations deemed appropriate.

Finally, schools and the university should consider developing a charter or a set of guidelines and responsibilities for their Green Teams. The charter or guideline should also include a succession plan to ensure the Green Team survives should any key administration or education professionals leave their positions. (See Appendix B for additional suggestions.)

APPENDIX J. RECYCLING CONTAINERS

Indoor Trash and Recycling Containers

1. Appearance

Ideally, recycling and trash containers should be consistently branded within an institution so the intended use of each container is clear to students, staff, visitors, and custodians. Consistent branding can be done using colors and labels.

i. Colors

Use a consistent color scheme, such as blue containers for recycling, green containers for organics, and black containers for trash. An alternative, more subtle approach to branding with color involves using the same color for all large containers and using different color lids to designate the intended use for each container. Below are examples of both types of color branding schemes:

ii. Labeling

Using a combination of text and pictures creates effective labels for trash and recycling containers. Text and pictures should be large enough to see from a distance of several feet for large containers. Labeling for smaller containers meant to be used in individual offices can be smaller. If decals will be used to label collection containers, ensure that the label will be visible once a liner is put into the container. If budget permits, consider affixing decals on multiple sides of a container so the label is still visible regardless of the direction the container is oriented.

iii. Size

As a general rule for educational buildings, three sizes of containers work well for most areas. Most individual offices or workstations can be served by 28-1/8 quart containers. Most classrooms and media centers can be served by 10 gallon containers. Some high-volume classrooms may require 10 gallon containers. Mail rooms, areas containing a copier, community printer, or paper cutter, places where groups congregate, and high-traffic hallways will require 23 gallon "slim jim" containers. The table below presents suggestions on the location and sizes of containers that are typically used in educational buildings; however, each building's waste flow is unique and should be considered when choosing container sizes.

Location	Size	Example
• Individual offices	28-1/8 Quart	
• Classrooms • Media centers	10 Gallon	

Location	Size	Example
• Mail rooms • Copier rooms • Areas with a shared printer or paper cutter • Congregation areas (study halls, auditoriums) • Hallways with high volume traffic	23 Gallon "Slim Jims" Optional lids to decrease contamination	

iv. Placement

In the majority of cases, recycling containers should be placed directly adjacent to trash containers. Pairing containers in this manner will decrease contamination. When containers are not paired, or placed even a few feet apart, the percentage of trash contamination in recycling bins and vice versa increases significantly.

The placement of paired containers in classrooms is usally effective near the exit way. In administrative areas, the most effective placement of paired containers is one pair per occupied desk.

Pairing of containers is typically not necessary in restrooms, where the majority of waste tends to be paper towels.

2. Special Areas (Cafeterias, Outdoor Areas, and Restrooms)

i. Cafeterias

Paired containers work well in cafeterias. If food waste will be collected, paired containers should include a bin for food waste, a bin for trash, and a bin for recycling. Containers used in cafeterias must be large enough so multiple people can access a disposal area simultaneously. Below are examples of effective options for collecting three waste streams in a cafeteria.

ii. Outdoor Areas

Outdoor areas where people tend to congregate, such as main entryways, can benefit from having trash and recycling and recycling containers present. Oftentimes, labeling on outdoor recycling containers is not clear or the materials accepted are not stated. When selecting paired waste and recycling containers for outdoor areas, it is important to select a collection system that:

- Can withstand wind without toppling or allowing materials to escape
- Minimizes exposure of materials to precipitation
- Presents clear labels defining which materials are accepted

(left): Labeling is unclear regarding which materials are accepted; (right): Containers are secure, materials are shielded from precipitation, and labeling is effective.

iii. Restrooms

Restrooms typically do not benefit from paired waste and recycling containers because most waste generated in restrooms consists of paper towel waste. Paper towel waste is light, but tends to take up more volume in trash containers, so a larger container with a round opening works best. For restrooms with heavier traffic, a 22

gallon waste container would work well. Restrooms with less traffic, like those in staff lounges, can use 10 gallon containers.

(left): 22 gallon waste container; (right): 10 gallon container

Uncontaminated paper towel waste can be composted. If restrooms tend to create a mixed stream of waste, an additional small container could be placed in restrooms to collect non-paper towel waste. The following figure presents an example of a two-container system:

Source: *The UW Garbology Project. <uwgarbology.weebly.com/maras-page.html>, accessed 1 September 2014.*

APPENDIX K. SPECIAL EVENTS

Most institutions and sometimes businesses host special events during the year. Events for large groups of students, parents, and/or clients may require additional planning efforts to ensure zero waste efforts can be executed and continued. Some possible strategies for consideration are listed below.

- When planning for special events, identify which waste materials will be generated and investigate whether alternative products can be used to eliminate or reduce waste.
- Purchase products that can be reused, repurposed, recycled, or composted. Product packaging should also be evaluated.
- Require cafeteria/concessions/vendors by contract to carry out all unused product. The policy should require vendors to restock, donate, recycle, or compost materials instead of landfilling. By requiring a carry-in, carry-out deposit, vendors may be more motivated to participate.
- Require vendors to recycle or compost waste generated, including waste from setting up and tearing down.
- Require vendors to only distribute recyclable or compostable items to special event attendees; for example: using a ketchup pump instead of individual non-recyclable packets.
- Vendors should be required to recycle or compost all materials that are not reused or donated in appropriate containers.
- Set up appropriate collection bins to capture the anticipated waste streams that will be generated at the event. Ensure that workers and attendees have adequate access to recycling containers as well as disposal bins.
- Ensure all containers are clearly labeled.
- Include Zero Waste statements in communication to attendees. For example, as part of a welcome speech, inform guests that the event is Zero Waste and request their support by using the correct labeled bins to discard materials.
- If implementing a zero waste strategy for a special event adds additional cost for an institution, investigate the opportunity of garnering financial support from a business as a sponsor.
- Verify whether specific organics (i.e., bones, meats, etc.) and compostable tableware planned to be used at the event are accepted by the facility that will manage organic waste from the event.
- Have volunteers help direct patrons to the proper receptacles and monitor the containers throughout the event for contamination.

Ohio EPA has prepared a zero waste planning guide for special events which is available at:

http://epa.ohio.gov/Portals/29/documents/1786_zerowaste_guide_FINAL.pdf

Keep Ohio Beautiful has developed a material distribution program for local government and non-profit agencies to apply for special events recycling & waste reduction supplies. See http://keepohiobeautiful.org/zero-waste-event-partnership-grant/ for details about this program.

Sporting Events

Sporting events at schools and universities offer both a unique challenge and opportunity to recover recyclables and food waste. U.S. EPA has published a document entitled, "A Guide to Recycling at Sports Venues" which provides useful suggestions. It is available at:

https://www.epa.gov/sites/production/files/documents/recyclingsportsvenues.pdf

APPENDIX L. FOOD WASTE OPTIONS

Overview

According to waste compositions studies, food waste is the single largest category of solid waste generated at elementary, middle, and high schools. Some businesses and other institutions also generate a high percentage of food waste. It is likely that other materials in addition to food waste would also be suitable for composting.

Obtaining accurate data with regard to the types and amounts of compostable materials generated is very important for designing a food waste recovery system and sizing it appropriately. It is recommended that data is gathered: (1) from at least one waste audit/sort, and (2) for the weight of compostable materials for a minimum of one month. This information can then be used to help determine the best composting system.

There are a number of options for composting food waste. At least two basic categories of composting systems should be considered for on-site processing: (1) in-vessel technology, and (2) low-tech turning bin system. Another option would be contracting with a solid waste hauler to have the food waste taken to an existing compost facility. All of these options have advantages and challenges which should be evaluated during the decision-making process.

A number of in-vessel composting systems which may be appropriate in size are available from vendors. (Information and references for some of these systems are available at the end of this appendix.) The "Earth Tub" is a model used by Youngstown State University (YSU). The Earth Tub is advertised as, "…ideal for composting at schools, universities, restaurants, hospitals and supermarkets." YSU installed an initial Earth Tub in the early 2000s, then added a second unit in 2012. Generally, YSU has been pleased with the operation and results of the Earth Tub. The table below compares the Earth Tub to the turning bin system and composting using worms.

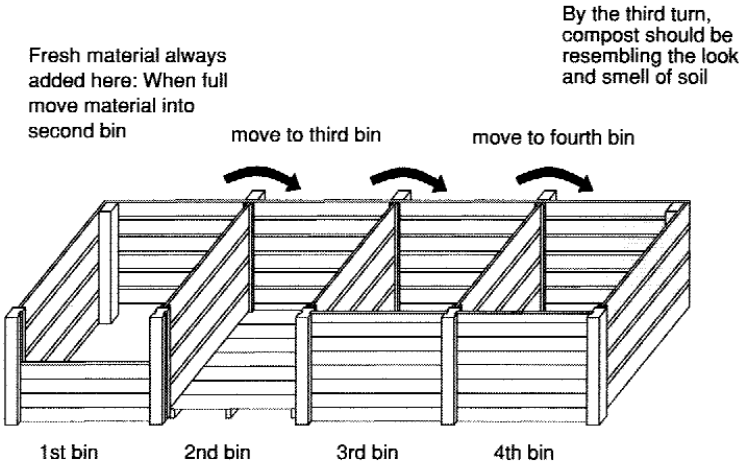
Ecovim manufacturers a dehydrator which is also an in-vessel technology option. The Ecovim 250 can process up to 250 pounds of organic waste each day to produce a highly-concentrated soil amendment. This unit, which is currently in use at the University of Dayton, costs approximately $15,000. More information regarding Ecovim is available at the end of this appendix.

The turning bin system is another option for composting which has been used successfully by some schools. From ***School Composting: A Manual for Connecticut Schools:***

"A series of bins with common removable walls and fronts allows compost to be turned from one bin to the adjacent bin conveniently. Fresh food waste is always deposited into the first bin. When the first bin is full, the contents are turned into the second bin. The first bin is

started all over again. When the first bin is full again, the second bin is turned into the third bin, and the first bin is turned into the second bin…", and so on. [page 11]

As shown in the following table, this alternative is much less expensive than the Earth Tub and probably provides more involvement for the students and as a result, a better learning experience. However, this system utilizes more space than the Earth Tub, takes longer to produce material ready for the curing stage of composting, and generally requires more attention and management. Ensuring that the food scraps are covered adequately each day is a critical operational component in order to avoid problems with flies and raccoons and other animals.



Compost System Comparison

	Type of System		
Comparison Parameters	**In-vessel (Earth Tub)**	**Turning Bin System**	**Worms**
Cost	$12,000, including delivery	$200 to $2,000	minimal for classroom size project
Space requirements (footprint)	12 sq. ft.	64 sq. ft. for four 4 by 4 bins	2 to 3 sq. ft.
Total Volume	3 cubic yards	2.4 cubic yards for initial composting bin	--

Compost System Comparison

	Type of System		
Comparison Parameters	**In-vessel (Earth Tub)**	**Turning Bin System**	**Worms**
Processing Capacity	100 lbs./day	depends on turning frequency	--
Affected by cold weather	lid froze at YSU during 2014	yes; unlikely to be any active composting during coldest weather	yes
Active composting period	2 to 3 weeks	depends on turning frequency	
Placement of unit (indoors or outdoors)	usually outdoors, but could be indoors if remote area	outdoors	must be heated during cold weather if outdoors
Nuisance odors	not usually a problem	could be a problem if not properly managed	no
Vectors (i.e., flies, rodents)	no	could be a problem if not properly managed	no
Oversight and management required	less than other systems	generally requires daily attention	minimal for classroom size project
Expertise required for person in charge	not required although helpful	recommended	not required

Worm composting is another option which is being done at some locations on a scale large enough to accommodate the food waste generated at schools. However, normally this option is not recommended as the primary management method for food waste. Instead, the construction of a small worm bin could be used for instructional purposes. Worm composting or vermicomposting was recently incorporated into Dublin, Ohio's Jerome High School's classroom experience. Resources for worm composting can be found at the end of this appendix and at the following link:

www.compost.css.cornell.edu/worms/basics.html

Other alternatives for recovering or reducing the food waste include contracting with a private hauler to deliver food waste to a local composting facility and/or negotiating with the company which provides the food to haul away all the food waste. In Franklin County during 2015, two Class II compost facilities accepted food scraps.[1]

The primary advantage of hauling the food waste off-site is time and resources: the institution or business would be required to provide minimal time and resources for implementation. However, in some cases, these options may also be the most expensive, and perhaps most importantly for schools, provide the least opportunity for student involvement and learning.

Additional Resources

1. Turning Bin Composting

Some schools in the United States have instituted composting operations for food waste using a low-tech turning bin system. Typically, a number of bins (usually three or four) are created using wood, concrete blocks, or plastic lumber. The bins, which are normally 4 feet by 4 feet by 4 feet in size (or larger), are used to contain the organic materials at various stages during the decomposition process.

In Connecticut, the experiences at the Mansfield Middle School were used to develop a manual for turning bin composting at schools. This manual is available online at:

http://www.ct.gov/deep/lib/deep/compost/compost_pdf/schmanual.pdf

Another useful manual developed in Vermont for school composting is available at:
http://greenmountainfarmtoschool.org/

[1] Composting facilities in Ohio are regulated by Ohio EPA, and Class II composting sites are allowed to accept source-separated food waste.

A school composting project was created in 2006 in Ohio as the "Columbus Academy Composting Initiative." Links for this project are as follows:

http://web.epa.ohio.gov/ocapp/food_scrap/columbus_academy.html
https://www.youtube.com/watch?v=85TWhEnuhJ8

2. Worm Composting

Resources for worm composting can be found at the following links:

http://vermicomposters.ning.com/
http://www.cityfarmer.org/wormcomp61.html

3. In-Vessel Systems

A number of in-vessel composting systems are available and information regarding some of these are included in this appendix. Inclusion of a particular system should not be interpreted as an endorsement.

The Earth Tub. In Ohio, the Earth Tub has been installed at Youngstown State University. The contact at Youngstown State in the Sustainability Office for information regarding the Earth Tub is:

Dan Kuzma
Phone: 330-941-2294

Online information for the EarthTub can be found at:

http://compostingtechnology.com/in-vessel-systems/earth-tub/

Ecovim. Another option for in-vessel food waste recovery at the school is a dehydrator manufactured by Ecovim. The University of Dayton currently uses an Ecovim unit which costs approximately $15,000. Dining Services can be reached by phone at (937) 229-2441 The Ecovim website is:

http://www.ecovimusa.com/

4. Toolkit with Policies for Reducing Food Waste Disposal

The releases "Keeping Food Out of the Landfill: Policy Ideas for States and Localities" is a toolkit developed by the Harvard Law School Food Law and Policy Clinic (FLPC). This

toolkit provides comprehensive information on eight different policy areas that states and localities can consider as they take steps to reduce food waste. Each section of the toolkit describes the relevant federal laws, provides state examples, and offers the Clinic's policy recommendations. The policy areas include:

- Liability Protection for Food Donations;
- Tax Incentives for Food Donations;
- Date Labeling;
- Food Safety for Food Donations;
- Food Waste Reduction in K-12 Schools;
- Feeding Food Scraps to Livestock;
- Organic Waste Bans and Waste Recycling Laws; and
- Government Support for Food Waste Reduction.

This resource covers a range of policy examples from all over the country, such as Virginia's tax incentive for food donors, California's funding to support food recovery infrastructure, guidance by Indiana to help schools implement share tables and reduce food waste, and organic waste bans and waste recycling laws from New York City to Vermont. A variety of educational resources are included in the toolkit to encourage readers to expand their knowledge of ways to address food waste. See:

http://www.chlpi.org/flpc-releases-toolkit-to-promote-food-waste-reduction/

5. Food Recovery in Schools

The following link opens a webpage on U.S. EPA's website, and provides information on food waste recovery in schools. Three presenters are featured on a webinar, and each presenter has been involved in helping to implement food waste programs in schools.

https://www.epa.gov/smm/sustainable-materials-management-smm-web-academy-webinar-reducing-and-recovering-wasted-food

6. Food Waste Recovery in Hospitality Sector (i.e., restaurants, catering, etc.)

The following link opens a webpage on U.S. EPA's website, and provides information on food waste recovery for restaurants and the hospitality industry. Four speakers who work in the hospitality and/or restaurant industry provide information through a webinar, and share their insights on successful collaborations and approaches promoting sustainable food management, food recovery for donation, and the unique partnerships they have built in their communities. Presenters include representatives from the National Restaurant Association, a Denver-based catering company, a non-

governmental organization providing business technical assistance, and an organization whose mission is to feed the hungry.

https://www.epa.gov/smm/sustainable-materials-management-smm-web-academy-webinar-innovative-collaborations-hospitality

APPENDIX M. ZERO WASTE IN SCHOOL CURRICULUM

Overview

Introducing or expanding the concept of sustainability within a school or university curriculum should be explored. In addition, information pertaining to the ZWP, its goals, purpose, and programmatic content should be included with sustainability.

Many resources exist for incorporating sustainability and zero waste concepts into school curriculum. Some of these resources are listed in the second section of this appendix. SWACO has a number of resources available for classrooms on their website at:

https://www.swaco.org/201/Schools

Hosting a "Science Fair" for zero waste could be viewed as a type of curriculum offering, using real-life issues related to waste management and waste minimization. A science fair for zero waste could be designed as a cross-disciplinary approach, involving a combination of science, technology, engineering, and math to understand, explore, and solve problems.

"Julian's Science Fair"[1] is a website for educators that compiles ideas for projects, experiments, labs, lesson plans, and science fair projects by grade level and subject. The Waste Management page and Recycling page include numerous ideas that can be adapted for a variety of classes. Each listing provides supplemental materials such as research papers, instructions (background, methods, procedures, questions, etc.), and project summaries. Some ideas for experiments or demonstrations include:

- Designing for biodegradation: Harnessing natural decay by managing physical and chemical dynamics.
- Identifying whether non-biodegradable poly(vinyl chloride) plasticizers be replaced by safer organic alternatives.
- Studying auto body plastic filler (ABPF) to identify whether it degrades, and how it may affect the environment, landfills, water system, soil and the degradation of other materials.
- Identifying which kinds of waste break down the fastest and the most by volume/weight.
- Studying the rate of decomposition on different biodegradable and compostable materials.
- Creating practical biodegradable packaging materials with varying concentrations of glycerin and different types of starch.

[1] See http://www.juliantrubin.com/fairprojects.html.

Additional Curriculum Resources

Many resources are available from organizations and state and federal agencies which provide assistance in incorporating zero waste concepts, sustainability, and zero waste courses into the curriculum at schools. Selected sources of this information are listed below.

U.S. Environmental Protection Agency. U.S. EPA maintains an extensive resource center on its website for teachers and students. Activities are available for a variety of interests, and are categorized by grade level. The website is:

http://www.epa.gov/epawaste/education/index.htm

The Green Team. From their website:

> "THE GREEN TEAM is an interactive educational program that empowers students and teachers to help the environment through waste reduction, recycling, composting, energy conservation and pollution prevention."

This website is presented by the Massachusetts Department of Environmental Protection, and is designed for schools in Massachusetts. However, curriculum resources, activities, and lesson suggestions are available for use by any school. This excellent resource can be found at:

http://www.thegreenteam.org/

State of Connecticut, Department of Energy and Environmental Protection. Lesson plans and activity guides are included on the department's website which also has other useful information:

http://www.ct.gov/deep/cwp/view.asp?a=2714&q=443766&deepNav_GID=1645

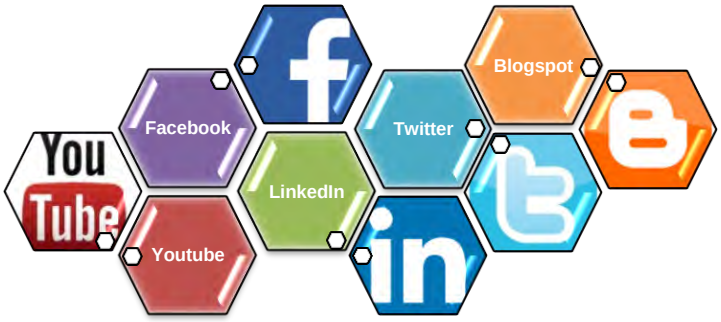
Facing Our Future. This organization provides information on a wide range of environmental topics and provides free lessons plans as well as more extensive plans which can be purchased.

http://www.facingthefuture.org/

APPENDIX N. COMMUNICATION PLAN

An effective communication plan is critical for successful implementation of a zero waste plan (ZWP) or a sustainability plan. The communication plan should consist of several components, including:

- A plan overview presentation
- The use of social media
- A newsletter
- A permanent display



The overview presentation needs to explain the purpose of the ZWP, why it's important, and the various programs associated with its implementation. The presentation could be developed as a slide show, however, a video presentation would be preferable, and in a school, could be designed and created by students in upper-level grades as a class project. The presentation should be shown to all new students, staff, and employees on a regular basis, and could be a component of new student/staff/employee orientation. The presentation should be reviewed at the end of each school year and updated based upon changes in waste reduction and recycling occurring at the school as a result of the ZWP implementation.

The use of social media should also be an important part of the communication plan. The objective of using social media is to educate students and staff with regard to the content of ZWP, and provide encouragement and suggestions for involvement in ZWP programs. The following social media and internet opportunities should be considered as a starting point for this aspect of the communication plan:

- Create or upgrade an existing website addressing sustainability or zero waste
- Twitter
- Facebook
- BlogSpot
- LinkedIn
- YouTube

The development of this portion of the communication plan could also be the focus of class projects for students in different grade levels.

The development of a newsletter published every month periodically will provide another opportunity to educate students and staff regarding the ZWP programs and provide regular updates for the amount of waste reduction and recycling occurring. The newsletter which could be offered electronically, as hard copy, or both, could be an excellent opportunity for students to improve writing skills and gain some experience in interviewing techniques as information is gathered for newsletter articles.

Institutions and businesses should also consider devoting space in a building for a permanent display showing ZWP program activity. The display could include:

- Charts demonstrating the current waste diversion percentage vs. the waste diversion percentage goals
- "Science Fair" projects for ZWP
- Results of most recent waste sorts
- Posters designed to encourage ZWP participation

APPENDIX O. PLASTICS RECYCLING

Many resources are available for plastics recycling. Moore Recycling Associates is an internationally recognized consulting and management firm specializing in the recycling of packaging materials, particularly plastics. This company maintains a website (http://www.plasticsmarkets.org/plastics/index.html) which includes information helping to connect suppliers and buyers of all types of scrap plastic (from bales to post consumer resin). The website also contains information addressing:

- Residential plastics recycling
- Specifications for plastic bales
- Annual reports for plastic recycling by type of plastic

"Recycle More Plastic" (http://www.recyclemoreplastic.org/) is another website devoted to improving the recovery and marketing of plastics. This website provides:

> "…common terminology for community recycling programs throughout the United States and Canada to use with residents when communicating about plastics recycling, along with simple tools to help recycling programs adopt this common language. The Terms and Tools address many types of plastics that are collected for recycling and are designed to help communities increase the quality and quantity of plastics collected and to facilitate better tracking."

"Recycle More Plastic" also includes maps showing locations across the United States where polypropylene and polystyrene are being collected for recycling.

To find information regarding plastic bag recycling, the following website is available:
http://www.plasticfilmrecycling.org/

U.S. EPA Resources

U.S. EPA has included a presentation on their sustainable materials management webpages addressing plastic film recycling. The webinar suggests best practices approaches, and practical information for enhancing film recycling education in communities. It also covers tools and tactics to help educate communities regarding: not bagging recyclables or recycling plastic film curbside, and how to facilitate more commercial plastic film recycling.

https://www.epa.gov/smm/sustainable-materials-management-smm-web-academy-webinar-lets-wrap-wrap-recycling-action-program