

RECYCLABLES CHARACTERIZATION STUDY

FOR THE CITY OF READING, PA

DRAFT REPORT

August 31, 2020



MSW CONSULTANTS

11875 High Tech Avenue, Suite 150, Orlando, FL

(800) 679-9220

mswconsultants.com



This report was delivered electronically. If it is necessary to print hard copies, please do so on post-consumer recycled paper and recycle.

TABLE OF CONTENTS

TABLE OF CONTENTS	I
1. INTRODUCTION	1
2. STUDY APPROACH	1
2.1 Residential Waste Generation	1
2.2 Sampling Plan	2
2.3 Material Categories.....	2
3. FIELD DATA COLLECTION METHODS	3
3.1 Recyclables Sampling.....	3
3.2 Manual Sorting	4
3.3 Sample Weights	4
3.4 Data Recording.....	5
3.5 Data Analysis	5
4. RESULTS	5
4.1 Recyclables Composition	5
4.2 Bagged Materials	7
5. CONCLUSIONS AND RECOMMENDATIONS	9
5.1 Conclusions.....	9
5.2 Recommendations	10

LIST OF APPENDICES

- Appendix A – Material Category Definition
- Appendix B – Composition of Sampled Trash

LIST OF FIGURES

Figure 3-1 Systematic Sampling Procedures for Incoming Loads.....	4
Figure 3-2 Typical Materials Sorting Platform.....	4
Figure 4-1 Aggregate Recyclables Composition.....	6
Figure 4-2 Composition of Bagged Materials within Recycling Stream	8
Figure 5-1 Comparative Refuse and Recyclables Generation in PA Cities	10

LIST OF TABLES

Table 2-1 Reading Solid Waste Service Levels and Tonnages	2
Table 2-2 Recyclables Sampling Plan.....	2

TABLE OF CONTENTS

Table 2-3 Materials Categories and Groups.....3
Table 3-1 Sample Weight Targets vs. Actuals.....5
Table 4-1 Detailed Composition of Aggregate Recyclables7
Table 4-2 Composition of Bagged Materials9

DRAFT

RECYCLABLES CHARACTERIZATION STUDY

1. INTRODUCTION

The City of Reading (City) is located in southeastern Pennsylvania and with approximately 88,500 residents is the fifth-largest city in the Commonwealth. The City engaged MSW Consultants in 2020 to provide an array of solid waste and recycling planning services including a waste and recyclables characterization study (Study).

The City's solid waste services currently include weekly trash collections for 21,072 households (in buildings of four residential units or less) and weekly single-stream recyclables collections for 26,678 households, both collected through a contract with Republic Services¹. Republic disposes of the City's residential trash at the company's Conestoga Landfill in Morgantown, PA, while recyclables are delivered to Cogle's Recycling in Hamburg for processing under a separate contract with the City. In parallel with this composition study, MSW Consultants is assisting the City with procurement of a new contract for residential collection, disposal and processing services.

A primary purpose of this Study was to inform and provide composition data as part of the City's 2020 procurement process for new contract services. However, execution of this Study was impacted by issues and restrictions related to the Coronavirus (COVID-19) pandemic. The field and data collection phase of the Study initially commenced in early April 2020, only to be suspended at the outset of sorting. The recyclables characterization component of the Study was rescheduled and performed during the week of August 10th. The residential waste characterization portion was not rescheduled. Accordingly, the report will present and discuss findings only from the recyclables characterization effort. A statistically insignificant number of trash samples were obtained prior to suspension of the field data collection, and the average composition of these samples is presented as an appendix to this report, but without any accompanying analysis or interpretation due to the small sample size.

2. STUDY APPROACH

MSW Consultants submitted the Study Design as well as its Safety and Health Plan (SAHP) to the City for its review on March 24, 2020. The Study Design utilized residential services and tonnage data provided by the City, detailed the number of samples to be acquired each day, identified the materials categories, and summarized the methodology for obtaining and sorting materials.

2.1 RESIDENTIAL WASTE GENERATION

Residents are allowed to place trash out in bags and approved rigid containers supplied by each household, while recyclables are collected from a combination of City-issued carts and resident-provided recycling bins. Residents are allowed to set out one bulky item per week as part of their trash service. Table 2-1 provides relevant demographic and generation data about Reading's single family residential sector

¹ Reading households are currently able to opt-out of the City's contracted residential trash collection services which explains the 5,606 unit difference between the number of households receiving trash collection and recyclables collection. The City is in the process of revising its collection system to become the exclusive provider of both refuse and recycling curbside collection for its residential sector.

RECYCLABLES CHARACTERIZATION STUDY

Table 2-1 Reading Solid Waste Service Levels and Tonnages

Service	Households Served	Tons Collected	Tons/Year/HH
Trash	21,072	26,617	1.26
Recyclables	26,678	4,787	0.18

The City’s Public Works Department also provides collections from approximately 60 City facilities and public schools, as well as roll-off collections for litter abatement projects and tire removal. However, only materials generated from residences were part of this study.

2.2 SAMPLING PLAN

One of the key objectives of the sampling plan for any waste characterization study is to obtain a representative distribution of samples from the targeted generator sectors. MSW Consultants reviewed tonnage data provided by the City and settled on a target of 22 random sampled of inbound single stream recyclables for the recycling characterization study. Ultimately, MSW Consultants successfully obtained and sorted 27 samples to exceed the target by five samples. The increase to the targeted number of samples improves the accuracy of the resulting composition estimate.

2.3 MATERIAL CATEGORIES

The materials categories were proposed and approved by the City as part of the Study Design and included 48 main categories and three subcategories. The materials categories are detailed below in Table 2-3 on the following page while the category definitions are included as Appendix A. Table 2-3 also denotes whether each material is targeted in the single stream recycling program, or is considered a contaminant.

Table 2-2 Materials Categories and Groups

Material Category	Material Category
Paper	Organics
OCC/Kraft Paper (Uncoated)*	Food Waste
Newspaper*	Yard Waste
Newspaper in Sleeves**	Remainder/Composite Organics
Office Paper (High Grade)*	C&D
Mixed Recyclable Paper (Low Grade)*	Wood - Treated/Painted/Stained
Aseptic Boxes & Gable Top Cartons*	Wood - Untreated/Clean
Compostable Paper	Drywall/Gypsum Board
Remainder/Composite Paper	Asphalt Roofing
Plastic	Asphalt Paving, Brick, Concrete, & Rock
PET (#) Bottles and Jars*	Carpet & Carpet Padding
PET (#1) Non-Bottles and Containers*	Remainder/Composite C & D
HDPE (#2) Natural Containers*	HHW
HDPE (#2) Colored Containers*	HHW
Rigid Plastic Containers #3, through #7	Batteries (All Types)
Expanded Polystyrene "Styrofoam"	Medically-Related Waste
Clean Retail Film Bags	Electronics
Clean Commercial/Consumer Film	All Electronics
All Other Film	Other
Durable/Bulky Rigid Plastics*	Textiles & Leather Products

RECYCLABLES CHARACTERIZATION STUDY

Remainder/Composite Plastic	Rubber Products
Metals	Disposable Diapers & Sanitary Products
Aluminum Containers*	Dirt & Fines
Aluminum Foils and Trays*	Bulky Materials
Other Non-Ferrous Metals	Other Materials Not Elsewhere Classified
Steel Cans & Lids*	Tanglers**
Other Ferrous Metals	Bagged Material**
Glass	
Glass Bottles, Jars & Containers	
Remainder/Composite Glass	

*Denotes targeted recyclable materials

**Denotes material categories exclusive to the single stream recyclables material stream

It should be noted that the sort of recyclables included three additional categories for materials commonly responsible for contamination in the recycling stream:

- ◆ **Newspaper/magazines in plastic sleeves or wrap.** The plastic film sleeve or wrap renders these items unrecyclable because the recycling facility cannot easily remove the plastic to recover the fiber.
- ◆ **Tanglers**, which are loosely defined as any item that impairs the sorting equipment at the material recovery facility by wrapping around screens and belts, and so typically includes coat hangers, electrical wires, hoses, cords, rope/string and related items.
- ◆ **Bagged materials.** Any material in the sample that is contained in bags and cannot be visually confirmed by pre-sort personnel as containing targeted recyclables. Bagged materials, even if they contain entirely recoverable materials, are usually removed at the start of the processing line because many bags of material contain only trash and would contaminate the processing line if they were not removed.

All bagged materials found in recycling samples were set aside until the final day of the waste composition study, and were then broken open and sorted as a single “bagged recyclables” sample. The composition of these bagged recyclables is contained in the results section.

It should also be noted that the results of this recycling composition study have been condensed to reflect only the material groups (rather than individual material categories) when none of the individual categories within a group is a targeted recyclable.

3. FIELD DATA COLLECTION METHODS

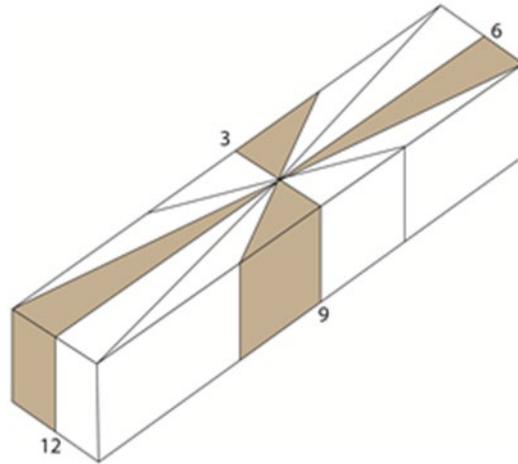
3.1 RECYCLABLES SAMPLING

Sample acquisition and sorting for residential recyclables were performed at Cogle’s Recycling in Hamburg, PA, during the week of August 10th.

The inbound loads identified in the sampling plan were diverted to the sorting area. MSW Consultants interviewed the collection vehicle drivers to confirm the origin and type of waste, as well as any other pertinent data. Prior to obtaining the sample, MSW’s Field Supervisor placed a placard with the identifying information in front of the tipped load and took photographs. From each selected load, one sample of material was selected based on systematic “grabs” from different approaches of the perimeter of the load. For example, if the tipped pile is viewed from the top as a clock face with 12:00 being the part of the load closest to the front of the truck, the first samples was taken from 3 o’clock, 6 o’clock, 9 o’clock, 12 o’clock, and then from 1, 4, 7, and 10 o’clock, and so-on (illustrated in Figure 3-1).

RECYCLABLES CHARACTERIZATION STUDY

Figure 3-1 Systematic Sampling Procedures for Incoming Loads



Once the area of the tipped load was selected, MSW Consultants' Field Supervisor coordinated with the host facilities' loader operator to take a "grab" sample of materials from that point in the tipped load. Grabs were distributed throughout the load, including the edge, center, top and bottom to assure all recyclables in the load had an equal chance of being selected. Samples were deposited in 35-gallon barrels to contain the sample and to enable the sampling team to pre-weigh the sample according to sample mass targets. Each sample was labeled by its identifying number using a white board. The white board for sample identification stayed with the sample until sorting and weigh out was completed.

3.2 MANUAL SORTING

Once each sample was been acquired, the material was manually sorted into the prescribed component categories. A combination of labeled plastic 18-gallon bins and 35-gallon barrels were used to contain the separated components. Sorters are typically trained to specialize in certain material groups, with someone handling the paper categories, another the plastics, another the glass and metals, and so on. In this way, sorters are able become more knowledgeable in a short period of time as to the definitions of individual material categories. Figure 3-2 shows a typical configuration of a sorting crew, sorting platform, and category containers.

Figure 3-2 Typical Materials Sorting Platform



3.3 SAMPLE WEIGHTS

The targeted sample weight for recyclables was between 125 and 150 pounds. The 27 samples obtained for this project weighed 3,552 lbs. in aggregate, for an average weight of 132 lbs. per sample.

3.4 DATA RECORDING

The weigh-out and data recording process can be the most critical component of the sort. The MSW Consultants' Crew Chief oversaw all weighing and data recording of each sample. Once each sample was sorted, and fines swept from the table, the weigh-out was performed. Each bin containing sorted materials from the just-completed samples was carried over to the portable scale for weighing and data recording by MSW Consultants' Crew Chief.

The Crew Chief utilized a tablet computer to record the composition weights. Each sample was also cross-referenced against the Field Supervisor's sample sheet to assure accurate tracking of the samples each day. The real-time data entry offers several important advantages:

- ◆ The template contains built-in logic and error checking to prevent erroneous entries.
- ◆ The template sums sample weights in real time so the Crew Chief and Field Supervisor can confirm achievement of weight targets for every sample.

The tablet synchronizes with the cloud via the Internet, providing excellent data security.

3.5 DATA ANALYSIS

A statistical analysis was performed to calculate the mean composition for each of the material categories and for each material stream in this study. Samples were first normalized by converting the sample data from weight to percentage. Then, the sample mean was determined by averaging the percent composition of each material across all samples.

Confidence intervals are provided for each material category as well as for major material groups (e.g., "paper", "plastic", etc.). Confidence intervals have been calculated at a 90 percent level of confidence, meaning that we can be 90 percent sure that the upper and lower bounds of a confidence interval successfully capture its respective population mean. (The converse is also true: that there is a 10 percent chance that a confidence interval will fail to capture its population mean.) In general, as the number of samples increases, the width of the confidence intervals decreases, although the more variable the underlying waste stream composition, the less noticeable the improvement for adding incremental samples.

4. RESULTS

4.1 RECYCLABLES COMPOSITION

Figure 4-1 below shows the composition of the curbside recycling stream in terms of targeted fibers (i.e. paper and cardboard), targeted containers (i.e. metals, plastics and glass), contaminants, and bagged materials, which are considered a form of contamination. Including bagged materials, total contamination was found to be 20.5 percent, although it is acknowledged that some bags do contain recyclables. Even if they contain entirely recoverable materials, bags are usually removed at the start of the processing line because many contain only trash and can contaminate the processing line if not removed.

RECYCLABLES CHARACTERIZATION STUDY

Figure 4-1 Aggregate Recyclables Composition

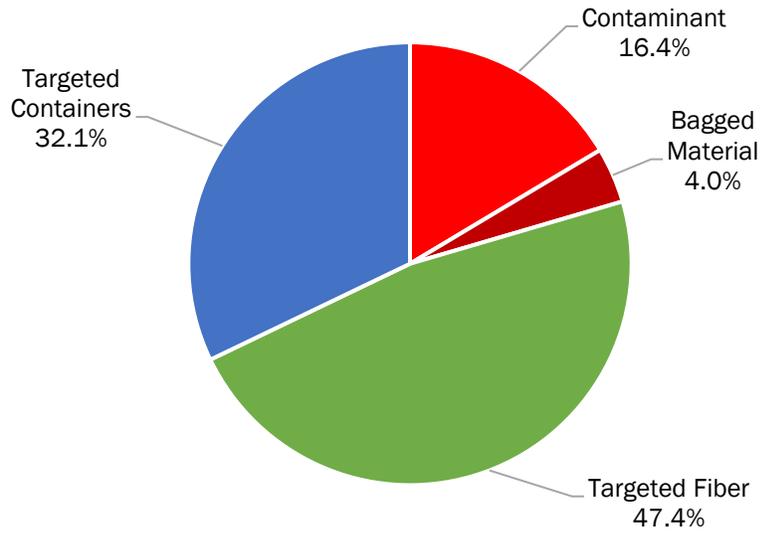


Table 4-1 below provides the detailed tabular composition of the aggregated single stream recyclables applied to the 4,787 tons of single-stream materials collected in Reading's curbside program. This table shows the mean composition, margin of error (at a 90 percent level of confidence) and the estimated tonnage of each of the constituents in the recycling stream.

RECYCLABLES CHARACTERIZATION STUDY

Table 4-1 Detailed Composition of Aggregate Recyclables

Material	Mean	+/-	Est. Tons	Material	Mean	+/-	Est. Tons
Paper	49.7%	4.1%	2,380	Glass	20.3%	3.8%	971
Corrugated Cardboard/Kraft Pap	35.5%	6.5%	1,699	Glass Bottles & Jars	19.6%	4.2%	938
Newspaper	2.6%	1.3%	124	Remainder/Composite Glass	0.7%	0.3%	33
Newspaper in Sleeves	0.8%	0.9%	37	Organics	2.0%	0.6%	96
Office Paper	0.5%	0.2%	24	Food Waste	1.9%	0.6%	90
Magazines, Catalogs & Brochure	0.7%	0.3%	34	Yard Waste	0.1%	0.1%	4
Phone Books & Directories	0.0%	0.0%	1	Remainder/Composite Organics	0.1%	0.0%	3
Chipboard/Paperboard	3.1%	1.0%	148	C&D	0.3%	0.1%	12
Aseptic Boxes & Cartons	0.3%	0.1%	17	Wood - Treated/Painted/Stained	0.2%	0.1%	7
Mixed Recyclable Paper	4.7%	1.4%	223	Wood - Untreated/Clean	0.0%	0.0%	1
Compostable Paper	0.9%	0.2%	41	Drywall/Gypsum Board	0.0%	0.0%	-
Remainder/Composite Paper	0.7%	0.2%	33	Asphalt Roofing	0.0%	0.0%	-
Plastic	14.8%	2.1%	709	Asphalt, Brick, Concrete & Rock	0.0%	0.0%	0
PET (#1) Bottles and Jars	4.9%	0.9%	233	Carpet & Carpet Padding	0.0%	0.0%	-
PET (#1) Non-bottle Containers	0.4%	0.1%	18	Remainder/Composite C&D	0.1%	0.1%	4
HDPE (#2) Natural Containers	1.7%	0.4%	82	HHW	0.04%	0.02%	2
HDPE (#2) Colored Containers	1.2%	0.3%	58	Household Hazardous Waste	0.0%	0.0%	1
Rigid Plastic Containers #3-7	0.8%	0.2%	37	Batteries (All Types)	0.0%	0.0%	1
Expanded Polystyrene "Styrofoam"	0.3%	0.1%	13	Medically-Related Waste	0.0%	0.0%	1
Clean Retail Film Bags	0.1%	0.1%	5	Electronics	0.6%	0.4%	29
Clean Commercial/Consumer Film	0.3%	0.2%	15	All Electronics	0.6%	0.3%	29
All Other Film	0.8%	0.2%	38	Other	7.4%	2.1%	353
Durable/Bulky Rigid Plastics	2.9%	1.2%	137	Textiles & Leather Products	0.3%	0.1%	15
Remainder/Composite Plastic	1.5%	0.5%	73	Rubber Products	0.0%	0.0%	1
Metals	4.9%	0.7%	234	Disposable Diapers & Sanitary	0.1%	0.1%	5
Aluminum Containers	1.2%	0.2%	58	Dirt & Fines	2.4%	0.6%	115
Aluminum Foils and Trays	0.2%	0.1%	11	Bulky Materials	0.0%	0.0%	1
Other Non-Ferrous Metals	0.5%	0.3%	25	Other Materials Not Classified	0.4%	0.2%	21
Steel Cans & Lids	2.2%	0.4%	103	Tanglers	0.0%	0.0%	1
Other Ferrous Metals	0.8%	0.3%	37	Bagged Material	4.0%	2.1%	194
				Total	100.0%		4,787
				<i>Number of Samples</i>		<i>27</i>	

4.2 BAGGED MATERIALS

As previously noted, the bagged materials found in each recycling sample were stored until the last day of the study and were then sorted as a single sample. Sorted bagged materials weighed 154.8 lbs., or approximately four percent of the total recyclables sampled. Figure 4-2 below shows the composition of the bagged materials within the recycling stream classified as targeted fiber, targeted containers, and contaminants. As shown, bagged materials contained more than 50 percent trash. Although some bags contained targeted recyclables, the incidence of trash causes the processor to remove all bags to prevent spreading this contamination to other clean recyclables.

RECYCLABLES CHARACTERIZATION STUDY

Figure 4-2 Composition of Bagged Materials within Recycling Stream

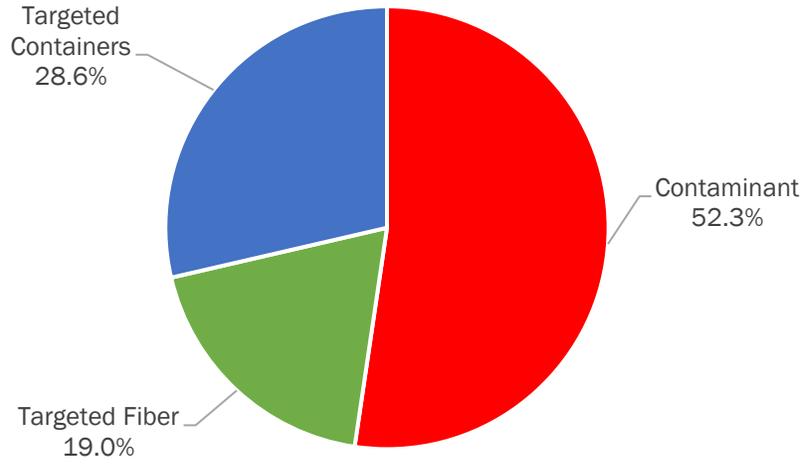


Table 4-2 below provides the detailed tabular composition of the bagged materials found in the single stream recyclables.

DRAFT

RECYCLABLES CHARACTERIZATION STUDY

Table 4-2 Composition of Bagged Materials

Material	Mean	Material	Mean
Paper	26.9%	Glass	7.5%
Corrugated Cardboard/Kraft Paper	9.1%	Glass Bottles & Jars	7.5%
Newspaper	2.4%	Remainder/Composite Glass	0.0%
Newspaper in Sleeves	0.3%	Organics	27.1%
Office Paper	0.5%	Food Waste	26.7%
Magazines, Catalogs & Brochures	1.5%	Yard Waste	0.0%
Phone Books & Directories	0.0%	Remainder/Composite Organics	0.4%
Chipboard/Paperboard	4.1%	C&D	0.5%
Aseptic Boxes & Cartons	0.8%	Wood - Treated/Painted/Stained	0.5%
Mixed Recyclable Paper	0.5%	Wood - Untreated/Clean	0.0%
Compostable Paper	5.0%	Drywall/Gypsum Board	0.0%
Remainder/Composite Paper	2.6%	Asphalt Roofing	0.0%
Plastic	26.3%	Asphalt, Brick, Concrete & Rock	0.0%
PET (#1) Bottles and Jars	7.7%	Carpet & Carpet Padding	0.0%
PET (#1) Non-bottle Containers	0.4%	Remainder/Composite C&D	0.0%
HDPE (#2) Natural Containers	3.1%	HHW	0.1%
HDPE (#2) Colored Containers	1.4%	Household Hazardous Waste	0.0%
Rigid Plastic Containers #3-7	2.7%	Batteries (All Types)	0.0%
Expanded Polystyrene "Styrofoam"	0.7%	Medically-Related Waste	0.1%
Clean Retail Film Bags	0.0%	Electronics	0.0%
Clean Commercial/Consumer Film	0.0%	All Electronics	0.0%
All Other Film	7.3%	Other	5.8%
Durable/Bulky Rigid Plastics	0.2%	Textiles & Leather Products	1.5%
Remainder/Composite Plastic	2.6%	Rubber Products	0.1%
Metals	5.8%	Disposable Diapers & Sanitary	0.9%
Aluminum Containers	1.6%	Dirt & Fines	2.2%
Aluminum Foils and Trays	0.6%	Bulky Materials	0.0%
Other Non-Ferrous Metals	0.0%	Other Materials Not Classified	1.1%
Steel Cans & Lids	3.6%	Tanglers	0.0%
Other Ferrous Metals	0.0%	Total	100.0%
		<i>Number of Samples</i>	5

5. CONCLUSIONS AND RECOMMENDATIONS

MSW Consultants offers the following recommendations and conclusions regarding the City of Reading's recyclables composition study:

5.1 CONCLUSIONS

Based on our professional experience conducting characterization studies around the U.S., we can offer the following comments:

- ◆ Reading's recyclables composition mix is within expected ranges, although the incidence of corrugated cardboard (OCC) appears to be on the high side. As a fraction of a typical residential recyclables stream, OCC has been trending upwards during the past 10 years due to increases in on-line purchases (which are typically delivered to consumers in OCC boxes). At the same time, newspaper generation has decreased due to the influence of digital media and smaller newspapers. It may be hypothesized that the OCC fraction may be slightly higher due to even greater increases in on-line purchasing during COVID-19 restrictions and stay-at-home orders.

RECYCLABLES CHARACTERIZATION STUDY

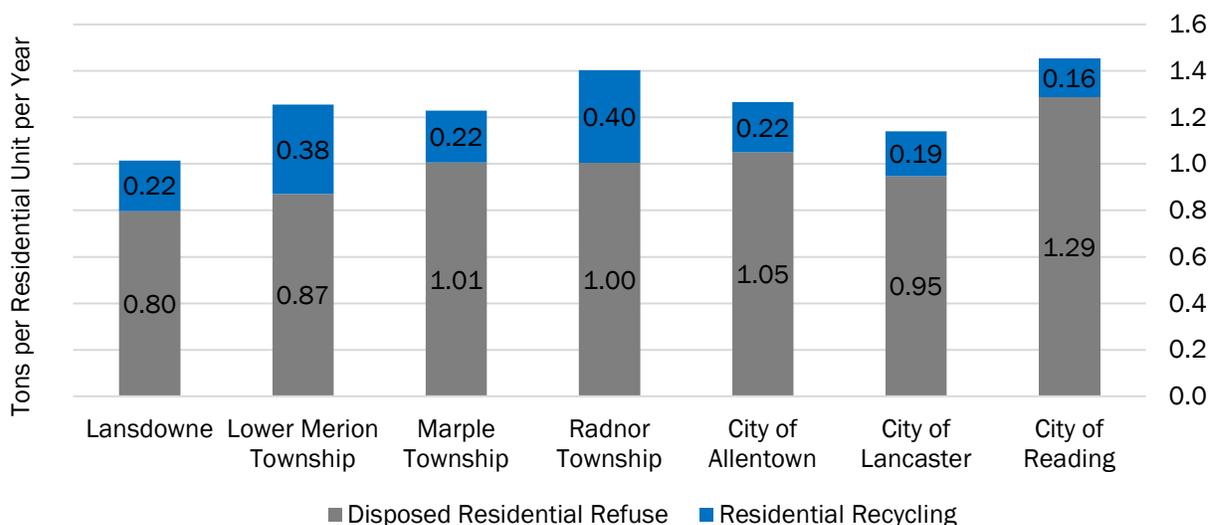
- ◆ The overall 20.5 percent contamination rate is within the 20 to 25 percent average range for single-stream recycling programs.
- ◆ Non-recyclable plastics such as EPS, film and other non-bottle rigid plastics make up nearly one-third of the 20.5 percent contamination rate, and should be addressed in future public education. No other single group of materials contributed as much to overall contamination.
- ◆ The bagged materials component of the overall contamination (4 percent of total composition) is comparatively low, although public education should remind residents not to place recyclables in bags.

5.2 RECOMMENDATIONS

- ◆ **Focus on Reducing Non-Recyclable Plastics in Recycling Stream:** As noted above, non-recyclable plastics are the largest combined contaminants fraction. The City may wish to consider outreach messaging that instructs residents to focus on plastic bottles or containers as well as keeping bags out the recycling stream.
- ◆ **Increase Recycling Program Participation and Yields:** In conjunction with reducing the use of bags for recyclables containment, and reducing the amount of non-recyclables plastics, the City should investigate ways to get more households to use the recycling program. MSW Consultants provided the following comments as part of its May 11th Waste and Recycling Program Benchmarking Memorandum which compared Reading with six other Pennsylvania municipalities:
 - ◆ Reading’s overall residential solid waste generation (refuse disposal plus recycling) is 1.45 tons per household per year, a level that is 20 percent higher than the average of the benchmark communities (1.22 tons).
 - ◆ At 1.29 tons per year, Reading generates 37 percent more refuse tons per household than the average of the six benchmark communities (.95 tons or 1,900 lbs. per HH per year).
 - ◆ At just 0.16 tons (or 320 lbs.) per household, Reading collects 40 percent fewer curbside recyclables compared to the average of the six benchmark communities (.27 tons, or 540 lbs. per HH). On a percentage basis, Reading’s calculated residential diversion rate is 14 percent, which is the lowest among the profiled cities.

The comparisons are shown below as Figure 5-1.

Figure 5-1 Comparative Refuse and Recyclables Generation in PA Cities



RECYCLABLES CHARACTERIZATION STUDY

The result of this study of the City's residential recyclables stream should help inform potential bidders as the City continues its procurement process for new residential collection and processing services. The findings and data should serve as a useful baseline for future recyclables composition studies, and will allow the City to determine the impacts of outreach initiatives, and assess program performance.

While this study provides a solid baseline for ongoing tracking of the City's curbside recyclables stream, the stream continues to evolve due to changes in media, product and packaging design, as well as consumer behavior. Further, waste management and recycling programs can undergo changes over time as local governments adapt to population growth, recycling market changes, and other forces. Accordingly, the City may wish to update this time series, and perform a waste characterization study in the future.

DRAFT

APPENDIX A
MATERIAL CATEGORY DEFINITIONS

DRAFT

This page intentionally left blank.

DRAFT

APPENDIX A – MATERIAL CATEGORY DEFINITIONS

PAPER

1	CORRUGATED CARDBOARD/KRAFT PAPER (UNCOATED): Corrugated boxes or paper bags made from Kraft paper. Wavy center layer sandwiched between two outer layers without wax coating on the inside or outside. Examples include cardboard shipping containers and moving boxes, computer packaging cartons, and sheets and pieces of boxes and cartons. Does not include chipboard. Examples of Kraft paper include paper grocery bags, un-soiled fast food bags, department store bags, and heavyweight sheets of Kraft packing paper. Relatively unsoiled pizza boxes acceptable.
2	NEWSPAPER: Paper used in newspapers and all items made from newsprint. Examples include newspapers and glossy inserts found in newspapers, and items such as free advertising guides, election guides, plain news packing paper, stapled college class schedules, and tax instruction booklets.
2R	NEWSPAPER IN SLEEVES (RECYCLING ONLY): Newspaper as defined above, but in a plastic film retail or delivery sleeve
3	OFFICE PAPER (HIGH GRADE): Paper that is free of ground wood fibers; usually sulfite or sulphate paper; includes office printing and writing papers such as white ledger, color ledger, envelopes, and computer printout paper, bond, rag, or stationary grade paper. This subtype does not include fluorescent-dyed paper or deep-tone dyed paper such as goldenrod colored paper.
4	MAGAZINES, CATALOGS & BROCHURES: Multi-page bound paper items (glued or stapled) made of glossy coated paper. This paper is usually slick, smooth to the touch, and reflects light. Examples include glossy magazines, catalogs, brochures, and pamphlets. Does not include newspaper inserts.
5	PHONE BOOKS & DIRECTORIES: This category includes books comprised of thin paper between coated covers. Such items are bound along the spine with glue. Examples include whole or damaged telephone books, yellow pages, real estate listings, and some non-glossy mail order catalogs.
6	CHIPBOARD/PAPERBOARD: Recyclable chipboard or uncoated paperboard such as cereal boxes, gift boxes and shoe boxes. Does not include coated paperboard such as those used for icecream or other frozen foods.
7	ASEPTIC BOXES & GABLE TOP CARTONS: Aseptic containers (multi-layered packaging that contains shelf-stable food products such as apple juice, soup, soy/rice milk, etc.) and "gable top" cartons (non-refrigerated items such as granola and crackers; refrigerated items such as milk, juice, egg substitutes, etc.). Rigid food and beverage cartons are usually paper-based, may be any shape, and may include a plastic pour spout as part of the carton.
8	MIXED RECYCLABLE PAPER (LOW GRADE): Recyclable paper other than the paper types mentioned above. Examples include junk mail, manila folders, manila envelopes, index cards, white envelopes, white window envelopes, notebook paper, carbonless forms, groundwood paper, softcover books, and deep-toned or fluorescent dyed paper.
9	COMPOSTABLE PAPER: Low-grade, biodegradable paper that cannot be recycled, as well as food contaminated paper. Examples include paper towels, napkins, paper plates, waxed papers and waxed cardboard, tissues, and unlined paper cups.

APPENDIX A – MATERIAL CATEGORY DEFINITIONS

10	REMAINDER/COMPOSITE PAPER: Paper products made mostly of paper but combined with large amounts of other materials such as plastic, metal, glues, foil, and moisture. Examples include corrugated cardboard coated with plastic, cellulose insulation, blueprints, sepia, onion skin, foiled lined fast food wrappers, frozen juice containers, carbon paper, self-adhesive notes, hardcover books, and photographs.
----	---

PLASTIC

11	PET (#1) BOTTLES AND JARS: Clear or colored PET bottles or jars. The plastic resin number “1” is visible in the center of the triangular recycling symbol and may also bear the letters “PETE” or “PET”. A PET container usually has a small dot left from the manufacturing process, not a seam. It does not turn white when bent.
12	PET (#1) NON-BOTTLE CONTAINERS: Non-bottle containers such as rectangular PET clamshell or tray containers used for produce; etc. The plastic resin number “1” is visible in the center of the triangular recycling symbol and may also bear the letters “PETE” or “PET”. The color is usually transparent, green, or clear. This category only includes PET non-bottle containers that did not previously contain hazardous materials.
13	HDPE (#2) NATURAL CONTAINERS : Natural colored HDPE bottles. This plastic is usually either cloudy white, allowing light to pass through it (natural). When marked for identification, it bears the number “2” in the triangular recycling symbol and may also bear the letters “HDPE. Also includes natural buckets, pails or paint cans made of HDPE and designed to hold 5 gallons or less of material. This category only includes colored HDPE containers that did not previously contain hazardous materials.
14	HDPE (#2) COLORED CONTAINERS: Colored HDPE bottles. In contrast with natural HDPE, the colored HDPE is usually a solid color and opaque. When marked for identification, it bears the number “2” in the triangular recycling symbol and may also bear the letters “HDPE. Also includes colored buckets, pails or paint cans made of HDPE and designed to hold 5 gallons or less of material. This category only includes colored HDPE containers that did not previously contain hazardous materials.
15	RIGID PLASTIC CONTAINERS #3, #4, #5, #6, AND #7 : Bottles, jars, containers, lids, and other packaging that are made of types of plastic other than PET (1) or HDPE (2). Items may be made of vinyl, LDPE, PVC, PP, PS, or other plastic. They may bear the number 3, 4, 5, 6, or 7 in the triangular recycling symbol, or may bear no recycling symbol. Examples include clamshells, trays, tray lids, cups, bowls, plates, hardware and fastener packaging, detergent and cleaning products bottles, squeezable bottles, frozen food containers, microwave food trays, vitamin bottles, cookie trays found in cookie packages, small (less than 1 gallon) brittle (single-use) plant containers such as nursery pots and plant six-packs.
16	EXPANDED POLYSTYRENE "STYROFOAM": Food and Non-food packaging. Includes clamshell "Styrofoam" food containers, as well as cups, plates, and bowls. Includes finished products made of expanded polystyrene such as block Styrofoam padding and packing peanuts.
17	CLEAN RETAIL FILM BAGS: Plastic retail bags used to contain merchandise to transport from the place of purchase, given out by the store with the purchase. Retail Film Bags sorted into this category will largely be clean: free of excessive debris or moisture.
18	CLEAN COMMERCIAL/CONSUMER FILM : Film plastic used to wrap merchandise to transport to the consumer. Includes dry-cleaning plastic bags, newspaper sleeves intended for one-time use, and non-bag commercial and industrial packaging film used for large-scale packaging or transport packaging. Examples include shrink-wrap, mattress bags, furniture wrap, and film bubble wrap. Commercial/Consumer Film products sorted into this category will largely be clean: free of excessive debris or moisture.

APPENDIX A – MATERIAL CATEGORY DEFINITIONS

19	ALL OTHER FILM: Plastic film or bags that are non-recyclable. Examples include garbage bags, and other types of plastic bags (sandwich bags, zip (recloseable) bags, produce bags, frozen vegetable bags), juice pouches, painting tarps, food wrappers such as candy-bar wrappers.
20	DURABLE/BULKY RIGID PLASTICS: Plastic items other than containers or film plastic, that are made to last for more than one use. These items may bear the numbers 1 through 7 in the triangular recycling symbol. Examples include crates, buckets (including 5-gallon buckets), baskets, totes, large plastic garbage cans, large tubs, large storage tubs/bins (usually with lids), flexible (non-brittle) and durable flower pots of 1 gallon size or larger, lawn furniture, large plastic toys, tool boxes, first aid boxes, and some sporting goods, CDs and their cases, plastic housewares such as durable (not single-use) dishes, cups, and cutlery.
21	REMAINDER/COMPOSITE PLASTIC: Plastic that cannot be put in any other type or subtype. Includes items made mostly of plastic but combined with other materials. Examples include auto parts made of plastic attached to metal, plastic drinking straws, produce trays, foam packing blocks (not including expanded polystyrene blocks), plastic strapping, handles and knobs, plastic cup lids, some kitchenware, plastic toys, plastic string (as used for hay bales), and plastic rigid bubble/foil packaging (as for medications).

METAL

22	ALUMINUM CONTAINERS (NOT MAGNETIC): Aluminum containers for food or beverage. Also includes aluminum cat food containers.
23	ALUMINUM FOILS AND TRAYS (NOT MAGNETIC): Non-container aluminum products such as aluminum foil or aluminum food trays. Does not include items significantly contaminated with food or other material.
24	OTHER NON-FERROUS METALS (NOT MAGNETIC): Any metal item, other than aluminum cans, foils or trays, that is not stainless steel and that is not magnetic. These items may be made of aluminum, copper, brass, bronze, lead, zinc, or other metals. Examples include copper wire, shell casings, and brass pipe. Also includes composite material that is mostly non-ferrous metal by weight.
25	STEEL CANS & LIDS (MAGNETIC): Steel or tin food or other containers. Includes aerosol containers. If significant food or other product remains in the container (greater than the weight of the container), it shall instead be sorted in that product material category.
26	OTHER FERROUS METALS (MAGNETIC): Any iron or steel that is magnetic or any stainless steel item. This type does not include tin/steel cans. Examples include structural steel beams, metal clothes hangers, metal pipes, stainless steel cookware, security bars, and scrap ferrous items. Also includes composite material that is mostly ferrous metal by weight.

GLASS

27	GLASS BOTTLES, JARS & CONTAINERS: Includes all glass bottles and jars, regardless of color. Examples include beer and soft drink bottles, and jars for food or other materials. If significant food or other product remains in the container (greater than the weight of the container), it shall instead be sorted in that product material category.
28	REMAINDER/COMPOSITE GLASS : Non-container glass. This category includes items made mostly of glass but combined with other materials. Examples include Pyrex, Corningware, crystal and other glass tableware, mirrors, non-fluorescent light bulbs, auto windshields, laminated glass, or any curved glass. Uncoated plate glass - includes window and door glass, table-tops, and some auto glass (side windows).

APPENDIX A – MATERIAL CATEGORY DEFINITIONS

ORGANICS

29	FOOD WASTE: Food wastes and scraps, including meat, bone, dairy, grains, rinds, teabags, coffee grounds with filters, etc. Excludes the weight of food containers, except when container weight is not appreciable compared to the food inside. Compostable peanuts, food packaging with food scraps, and small wooden produce crates are also included in this category.
30	YARD WASTE: Plant material, including woody material, from any public or private landscapes. Examples include leaves, grass clippings, plants, brush and branch prunings and trimmings.
31	REMAINDER/COMPOSITE ORGANICS: Organic material that is not food or yard waste. Includes cork, popsicle sticks, hair, animal waste, cigarette butts, chopsticks, woven baskets, and small non-construction related wood products.

CONSTRUCTION & DEMOLITION WASTE

32	WOOD – TREATED/PAINTED/STAINED: Wood that contains an adhesive, paint, stain, fire retardant, pesticide or preservative. Does not include wood furniture.
33	WOOD – UNTREATED/CLEAN : Any wood which does not contain an adhesive, paint, stain, fire retardant, pesticide or preservative; includes such items as bulky wood waste or scraps from newly built wood products. Does not including land clearing debris or yard waste prunings and trimmings. The presences of nails or screws are acceptable.
34	DRYWALL/GYPSUM BOARD: Interior wall covering made of a sheet of gypsum sandwiched between paper layers. Examples include used or unused, broken or whole sheets of sheetrock, drywall, gypsum board, plasterboard, gypsoc, and wallboard.
35	ASPHALT ROOFING: Composite shingles and other roofing material made with asphalt. Examples include asphalt shingles and attached roofing tar and tar paper.
36	ASPHALT PAVING, BRICK, CONCRETE, AND ROCK: Includes asphalt paving materials, set or unset, and all types of fire-clay bricks. Includes Portland cement mixtures (set or unset), with or without aggregate materials (gravel, etc.). Includes rock gravel larger than 2" in diameter.
37	CARPET & CARPET PADDING: Flooring applications consisting of various natural or synthetic fibers bonded to some type of backing material. Carpet padding may include plastic, foam, felt, or other material used under the carpet to provide insulation and padding.
38	REMAINDER/COMPOSITE CONSTRUCTION & DEMOLITION : Construction and demolition material that cannot be put in any other type or subtype. This type may include items from different types combined, which would be very hard to separate. Also includes fiberglass insulation, ceramic fixtures, and other miscellaneous C&D Materials not mentioned above.

HHW

39	HOUSEHOLD HAZARDOUS WASTE OR HHW: Hazardous household items containing paints, thinners, solvents, vehicle equipment fluids, cleaners, pesticides/herbicides and fertilizers. Includes fluorescent bulbs and CFLs, light ballasts, and mercury-containing devices.
40	BATTERIES (ALL TYPES): Dry batteries, rechargeable batteries and lead-acid batteries.
41	MEDICALLY-RELATED WASTE: Treated or untreated medical waste. Includes bandages, gauze, diabetic strips, syringes, needles, other sharps, and medical tubing. Includes similar items from veterinary usage, medical research, or industrial laboratories.

APPENDIX A – MATERIAL CATEGORY DEFINITIONS

ELECTRONICS

42	ALL ELECTRONICS: Includes all electronic items with a circuit board, including CRTs or other video displays, plasma and LCD monitors. cell phones, personal computers, laptop computers, notebook computers, processors, keyboards, etc. Includes stereos, VCRs, DVD players, etc. This category does not include automated typewriters or typesetters.
----	---

OTHER

43	TEXTILES & LEATHER PRODUCTS: Includes clothing, fabrics, curtains, blankets, stuffed animals, and other cloth material. Also includes leather products including belts, leather handbags, purses, and wallets. This category includes footwear that is mostly cloth or leather. Does not include carpeting.
44	RUBBER PRODUCTS: Finished products and scrap materials made of natural and synthetic rubber, such as bathmats, inner tubes (not tires), rubber hoses, and foam rubber. Includes rubber gloves and footwear (if predominately rubber).
45	DISPOSABLE DIAPERS & SANITARY PRODUCTS: Adult and baby disposable diapers, and feminine hygiene products.
46	DIRT & FINES: Small mixed fragments 2" and smaller, and includes miscellaneous fines (paper, plastic, glass, etc.), sand, and dirt.
47	BULKY MATERIALS: Large, hard-to-handle items that are not defined separately. Examples include all sizes and types of furniture, mattresses, box springs, and base components.
48	OTHER MATERIALS NOT ELSEWHERE CLASSIFIED : Any other type of waste material not listed in any other sort category. Includes cosmetics, shampoos, lotions, etc.
49	TANGLERS (RECYCLING ONLY): Non-film bag materials that get entangled in MRF sorting equipment, such as hoses, coat hangers, electrical cords, rope, etc.
50	BAGGED MATERIAL (RECYCLING ONLY): Bagged materials present in recycling samples in which the contents cannot be readily identified as recyclables. The entire days' collection of bagged materials will be set aside on a daily basis and sorted as a separate recycling sample at the end of the day.

APPENDIX B
COMPOSITION OF SAMPLED TRASH

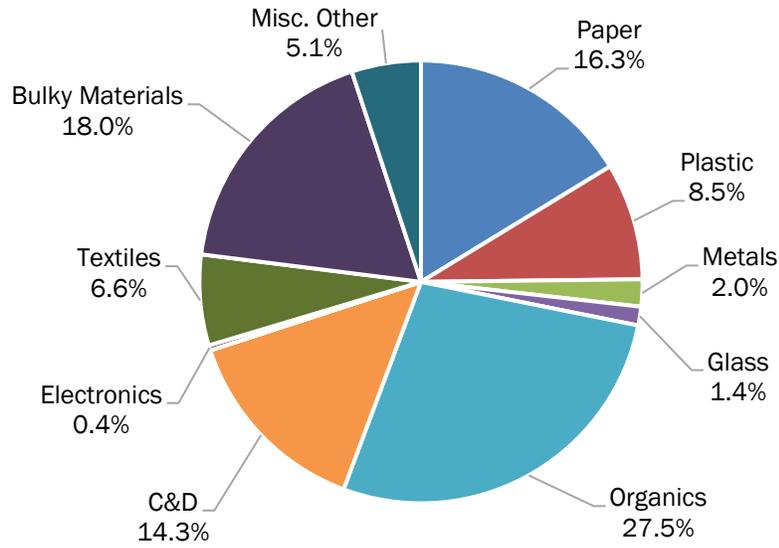
DRAFT

This page intentionally left blank.

DRAFT

APPENDIX B – COMPOSITION OF SAMPLED TRASH

Figure B-1 Composition of Sampled Trash



DRAFT

APPENDIX B – COMPOSITION OF SAMPLED TRASH

Table B-1 Composition of Residential Trash Sampled

Material	Est. %	Material	Est. %
Paper	16.3%	Organics	27.5%
Corrugated Cardboard/Kraft Paper	1.5%	Food Waste	12.0%
Newspaper	0.9%	Yard Waste	13.2%
Office Paper (High Grade)	0.4%	Remainder/Composite Organics	2.3%
Magazines, Catalogs & Brochures	0.2%	C&D	14.3%
Phone Books & Directories	0.7%	Wood - Treated/Painted/Stained	5.9%
Chipboard/Paperboard	2.1%	Wood - Untreated/Clean	0.2%
Aseptic Boxes & Gable Top Cartons	0.1%	Drywall/Gypsum Board	0.2%
Mixed Recyclable Paper (Low Grade)	2.8%	Asphalt Roofing	0.3%
Compostable Paper	5.8%	Asphalt Paving, Brick, Concrete, & Rock	0.0%
Remainder/Composite Paper	1.8%	Carpet & Carpet Padding	6.4%
Plastic	8.4%	Remainder/Composite C&D	1.3%
PET (#1) Bottles and Jars	0.8%	HHW	0.1%
PET (#1) Non-bottle Containers	0.2%	Household Hazardous Waste or HHW	0.0%
HDPE (#2) Natural Containers	0.0%	Batteries (All Types)	0.0%
HDPE (#2) Colored Containers	0.2%	Medically-Related Waste	0.0%
Rigid Plastic Containers #3-7's	0.9%	Electronics	0.4%
Expanded Polystyrene "Styrofoam"	0.5%	All Electronics	0.4%
Clean Retail Film Bags	0.1%	Other	29.6%
Clean Film	0.0%	Textiles & Leather Products	6.6%
All Other Film	4.6%	Rubber Products	0.6%
Durable/Bulky Rigid Plastics	0.1%	Disposable Diapers & Sanitary Products	2.6%
Remainder/Composite Plastic	1.0%	Dirt & Fines	1.3%
Metals	2.0%	Bulky Materials	18.0%
Aluminum Cans	0.3%	Other Materials Not Elsewhere Classified	0.5%
Aluminum Foils and Trays	0.3%		
Other Non-Ferrous Metals	0.5%		
Steel Cans & Lids	0.7%		
Other Ferrous Metals	0.2%		
Glass	1.4%		
Glass Bottles, Jars & Containers	1.3%	Total	100.0%
Remainder/Composite Glass	0.1%	No. of Samples	3