



City of Tucson Waste Diversion Plan and Roadmap

January 15, 2014

Prepared for

**City of Tucson
Environmental Services Department**

Prepared by

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NOTE: Per ESD’s request, all Attachments associated with this report were provided as individual PDF documents, rather than including them in the master document. For this reason, references made to Attachments are not hyperlinked, as they are for other types of references such as tables and figures.

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EXECUTIVE SUMMARY

BACKGROUND

The City of Tucson's Environmental Services Department (ESD) provides a range of collection services to 143,500 residents and businesses, and is responsible for the implementation of programs and policies that address Tucson's short- and long-term solid waste management needs in a sustainable and cost-effective manner. Like many other municipalities, Tucson seeks to develop and implement solid waste management programs and policies that will reduce the amount of material landfilled and increase the amount of material diverted to recycling or reuse. ESD has partnered with Cascadia Consulting Group, Inc. (Cascadia) to develop a *Waste Diversion Plan and Roadmap* to inform and guide Tucson's waste diversion efforts over the next three- to five-years.

This *Waste Diversion Plan and Roadmap* seeks to:

- Develop citywide waste disposal and waste diversion profiles, and estimate the City's overall waste diversion rate—based on data from ESD and private haulers and processors—and sector-specific waste composition estimates. This data will help ESD better understand current disposal and waste diversion activity, as well as key opportunities for increased waste diversion.
- Identify and prioritize waste diversion strategies that seek to empower Tucson residents and businesses to maximize their waste reduction and diversion efforts, and make recommendations for additional City actions to support these strategies.
- Inform the community and City about actions residents and businesses can take to maximize waste diversion efforts in a detailed plan and roadmap that summarizes project findings and recommends effective and feasible waste diversion strategies.

Ultimately, this *Waste Diversion Plan and Roadmap* strives to provide sufficient information to direct additional research and planning in order to launch a well-coordinated and scientifically and economically feasible implementation plan to reduce landfill waste through waste diversion.

PROJECT APPROACH

Between September and December 2013, ESD collaborated with Cascadia to assess and document current waste disposal and diversion rates, activities and organizations; and to identify and prioritize recommended waste diversion strategies.

ESD provided tonnage data to develop waste disposal and waste diversion rate estimates; this information represents the material collected and processed only by ESD, which is estimated to represent approximately 53 percent of the city's total disposed waste stream. In order to capture information regarding collection and processing activities performed within the private sector, Cascadia developed and conducted a survey of six private-sector haulers and privately owned recycling and disposal facilities operating within the City of Tucson. Tucson's residential and self-haul composition estimates utilized composition percentages that were based on waste composition studies from other communities. The commercial tonnage composition estimates utilized sector-specific waste composition profiles applied to Tucson's business mix and associated employment data.

Informed by Tucson's waste diversion and composition estimates and details regarding current waste diversion organizations and activities occurring within the Tucson area, Cascadia worked closely with ESD staff to identify and prioritize materials that represent opportunities for increased diversion, and on strategies that support the diversion of these materials. Materials identified as representing key diversion opportunities are disposed in relatively large volumes, have a strong customer demand for recycling opportunities, and have existing and viable collection, processing, or reuse infrastructures.

FINDINGS

The analysis of Tucson's disposal estimates found that in 2012, Tucson's commercial sector was the largest contributor to waste disposed at roughly 230,799 tons, or 55% of the city's total waste. The residential sector disposed of roughly 150,602 tons, and the self-haul sector disposed of approximately 43,363 tons. Of the 427,764 tons of waste disposed citywide, including residential, commercial, and self-haul wastes, organic waste made up about 41% by weight of the total waste disposed. This organic waste includes *food* (18.7%) and *yard debris* (12.1%), among other organic materials. Paper composed about one-quarter of the overall waste, and construction and demolition waste made up almost 13%, by weight. Additional sector-specific tonnage and composition data can be found in [Section 3.2](#).

The City of Tucson's diversion rate for the calendar year 2012 was approximately 10%, representing 47,138 tons. This estimate includes recyclables collected by ESD, in addition to recyclable materials collected by private-sector haulers and processors. Newspaper, cardboard and glass (27.4% combined) represented the largest quantities of material types in the citywide recycling stream. Based on data derived from waste characterization studies in other U.S. communities, Cascadia estimates that textiles make up about 4-6%, by weight, of all Tucson disposed waste.

With a diversion rate of approximately 10%, Tucson ranks low in comparison to top-performing municipal diversion programs in the cities of Seattle (55.7%), Portland (63%), and San Francisco (80%). However, it is important to note that a direct comparison of municipal diversion rates is difficult due to variances in local and state regulations, material markets, disposal fees, and calculation methods. It is also important to note that Tucson's diversion rate does not include the waste prevention, reuse, and recycling activities undertaken by various community organizations, boutique recyclers, and other local governments. Examples include Goodwill Industries, Tucson Pallets, and Freecycle.org. A listing of a representative sample of diversion activities and organizations serving the Tucson community was gathered through a survey of the Tucson Clean and Beautiful Recycling Directory and is included in this report as Attachments 5 and 6.

Based upon opportunity for diversion, cost effectiveness, customer demand, and alignment with City goals, ESD identified the following priority materials to be targeted in the prioritization of diversion strategies:

- Clothing/textiles
- Food waste
- Electronic waste
- Construction and demolition materials
- Expanded polystyrene
- Landscaping debris

Diversion strategies for all targeted materials are included in [Section 3.6](#) and were ranked in regards to their alignment with City preferences, waste diversion opportunity, and the potential for local partnerships.

RECOMMENDATIONS

Recommendations were developed in collaboration between ESD and Cascadia staff and reflect findings associated with this report. Key recommendations that should be considered for inclusion in Tucson's waste diversion efforts over the next three- to five-years include:

1. Defining ESD's role for promoting and tracking waste diversion
2. Requiring City-permitted waste and recycling collectors and processors, as well as non-profit organizations receiving trash credits, to report waste and recycling quantities to ESD
3. Considering conducting a waste characterization study
4. Considering further development of financial incentives for recycling and waste reduction
5. Continuing efforts to increase commercial recycling
6. Continuing partnerships with University of Arizona (U of A) to bolster and promote waste diversion to students and the community at large
7. Focusing ESD resources on materials that are still being disposed in large volumes, have strong customer demand for recycling services, and have associated waste diversion efforts that are self-sustaining, thereby not requiring any additional City funding or resources

Diversion Goal Setting

In order to establish a waste diversion (or recycling) rate goal for the City of Tucson (and to know if that goal is being achieved), it is necessary to understand, to the greatest extent possible, the amount of solid waste currently being generated in the city, the amount of solid waste being diverted through recycling and other diversion activities operating in the community, and how much waste is being reduced through source reduction activities.

This Waste Diversion Plan and Roadmap has established baseline estimates for waste disposal and recycling quantities for Tucson. However, the resulting diversion rate estimate relies upon incomplete data. For example, private haulers and processors do not typically track City of Tucson-specific or sector-specific waste and recycling quantities. Additionally, the waste composition profiles developed for this plan are modeled based on data from Western U.S. communities with similar waste streams.

Therefore, Cascadia has recommended in this report that the City of Tucson consider conducting a waste characterization study to better estimate the quantities and types (organic, recyclable, compostable, etc.) of waste. A waste characterization study would provide more accurate representative quantity and composition data, and will allow for the calculation of a more accurate diversion rate. Tucson can also begin developing a set of higher quality and more complete data over time by implementing Cascadia's recommendation for the City of Tucson to require waste and recycling collectors, processors, and non-profit organizations receiving trash credits to report waste and recycling quantities to ESD.

Until such time when ESD has access to more accurate citywide waste data, Cascadia does not recommend that Tucson establish a waste diversion goal based on a specific percentage (e.g., the City of Phoenix’ 40% diversion by 2020 campaign).¹

Rather, it is recommended that the City of Tucson establish a goal based upon a range of diversion efforts focusing on those individual recommendations that the City chooses to pursue, and the corresponding resulting impact on the overall diversion rate.

[Table 1](#) shows the full diversion potential for each of the targeted materials in this plan. Further analysis is needed to determine reasonable capture rates for each material and strategy, and develop a final diversion rate goal.

Table 1. Diversion Potential for Materials Targeted in This Plan.

Material Type	Annual Tons	Percent (by weight) ²
Newspaper and Other Paper	18,874	40.0%
Cardboard and Other Paper	12,128	26.7%
Other Mixed Glass	10,376	22.0%
PET Bottles	2,071	4.4%
Tin	1,086	2.3%
Other Plastics	943	2.0%
HDPE Pigmented Bottles	615	1.3%
HDPE Natural Bottles	545	1.2%
Aluminum	499	1.1%
Total	47,138	100%

¹ “Phoenix plans a heap of recycling education”, Betty Reid, The Arizona Republic, April 2, 2013

² May not sum to 100% due to rounding.

1. INTRODUCTION

1.1 PROJECT BACKGROUND

The mission of the Environmental Services Department (ESD) is to promote a healthy Tucson community by providing innovative and effective waste management and environmental protection services. ESD accomplishes this mission by delivering waste management services to Tucson residents and businesses and implementing solid waste and recycling programs and policies that encourage sustainable long-term recycling and materials management practices.

Presently, the City's ESD provides trash, brush and bulky collection, and recycling service for 140,000 residential customers.³ ESD also offers full-service commercial trash and recycling collection service to approximately 3,400 customers.³ The waste diversion rate for residential customers serviced by ESD was reported to the Tucson Mayor and Council on November 6, 2013 at 17% (by weight) and is achieved primarily through the City's residential recycling program. Commercial-sector waste diversion rates are more difficult to measure. In addition to the collection services provided by ESD, there are numerous private haulers and processors that also serve the City of Tucson's commercial and multifamily customer base through the collection of trash and the diversion of recyclable or reusable material. ESD estimates that it manages upwards of half of all waste generated by City of Tucson residents and businesses.³

Like many other U.S. cities, Tucson recognizes the importance of taking a strategic and thoughtful approach to facilitating programs and policies that will allow the City to increase the percentage of overall waste diverted from landfills over the coming years. Tucson, as well as the State of Arizona, has no mandated recycling laws or ordinances, and there are no government-directed waste diversion goals. With this in mind, it's important to note that waste diversion programs that may work well in places with established waste diversion mandates, like Seattle, Portland, and San Francisco, may not necessarily translate well in Tucson due to a fundamentally different regulatory environment.

As such, ESD partnered with Cascadia Consulting Group, Inc. (Cascadia) to develop a high-level *Waste Diversion Plan and Roadmap* that provides recommendations for increased waste diversion over the next three- to five-years. This plan will account for numerous factors that make Tucson's materials management system and infrastructure unique, and will offer recommendations prepared specifically for Tucson that will yield the most value to the department and the public.

³ City of Tucson, Environmental Services Department, Environmental Services Advisory Committee (ESAC) Orientation Packet, November 2013

1.2 WASTE DIVERSION PLAN AND ROADMAP GOALS

Through the *Waste Diversion Plan and Roadmap*, the City hopes to achieve the following goals.

1. Develop citywide waste disposal and waste diversion profiles and estimate the City's overall waste diversion rate—based on data from ESD and private haulers and processors—and sector-specific waste composition estimates. This data will help ESD better understand current disposal and waste diversion activity and key opportunities for increased waste diversion.
2. Identify and prioritize waste diversion strategies that seek to empower Tucson residents and businesses to maximize their waste reduction and diversion efforts, and make recommendations for additional City actions to support these strategies.
3. Inform the community and City about what residents and businesses can do to maximize waste diversion efforts in a detailed plan and roadmap that summarizes project findings and recommends effective and feasible waste diversion strategies.

Ultimately, this *Waste Diversion Plan and Roadmap* strives to provide sufficient information to direct additional research and planning in order to launch a well-coordinated, scientifically and economically feasible implementation plan to reduce landfill waste through waste diversion.

1.3 ORGANIZATION OF THE PLAN

The Tucson *Waste Diversion Plan and Roadmap* begins with a detailed overview of the plan's research approach, including the methodology used for evaluating current personal responsibility outreach efforts, assessing and documenting current waste diversion efforts, and identifying and prioritizing recommended strategies.

The remainder of the plan is organized into two primary sections: findings and recommendations.

Findings include:

- An assessment of current conditions, including:
 - Material flow within the public and private sector collection system.
 - Citywide and sector-specific disposal and waste diversion estimates.
 - Composition and quantity profiles by sector.
 - An inventory of current waste diversion activities and organizations.
- Prioritized waste diversion strategies.

Recommendations encompass priority strategies and other key suggestions for increasing waste diversion in Tucson. Finally, the waste diversion “roadmap” summarizes recommended strategies for increasing waste diversion over a three- to five-year planning period, including implementation phases and the relative impact of the various strategies.

2. PROJECT APPROACH

The following section details Cascadia's project approach, which was developed in collaboration with ESD staff, and includes methodologies for the following tasks.

- Assessing and documenting current conditions, including estimating Tucson’s current waste disposal and waste diversion rates and developing an inventory of waste diversion activities and organizations.
- Collecting feedback from Tucson’s Environmental Services Advisory Committee (ESAC).
- Identifying and prioritizing waste diversion strategies for future implementation.

2.1 ASSESSING AND DOCUMENTING CURRENT CONDITIONS

In order to effectively evaluate and recommend future waste diversion strategies, it is important to understand basic information, such as Tucson waste quantities and composition, as well as the city’s overall waste diversion rate. Additional data, such as sector-specific waste profiles, will be used to help prioritize waste diversion strategies for the City.

The City of Tucson’s access to tonnage and recycling composition data is limited to the portion of the overall waste stream that is collected and managed by ESD, which includes the single-family residential waste stream, much of the small multi-family (24 units or fewer) waste stream, and approximately 20% percent of the commercial waste stream.⁴ In total, ESD-managed material is estimated to compose about 53% of the city’s overall waste generation.⁵

Methodology for Developing Waste and Recycling Composition

This section describes the sources and calculations used to assess and document the waste and recycling quantities and composition for Tucson. Data were obtained from ESD, private haulers and facilities, and reports from other jurisdictions.

Developing Quantity Estimates

ESD provided disposal quantities for all waste sectors. Residential and commercial ESD estimates were based on internal collection and disposal reports. ESD reports that self-haul disposal at the Los Reales Landfill (Los Reales) is comprised of 76% City residents and 24% non-City residents.⁶ Commercial totals were supplemented with estimates from a hauler and facility survey that was administered by Cascadia.

The recycling quantity estimates were based, in part, on ESD’s data from reports provided by Waste Management, Freidman Recycling Company, and ReCommunity Recycling. The recycling quantities from ESD were supplemented with additional tons reported through Cascadia’s private-sector hauler and facility survey. The ReCommunity Materials Recovery Facility (MRF) provides a report to ESD with a breakdown of tons recycled by commodity (e.g., cardboard, newspaper). The recycling quantities by commodity were calculated by applying the percentage breakdown from ReCommunity’s reported totals to the total estimated recycling tons.

⁴ Informed estimate made by Pat Tapia, Administrator, City of Tucson Environmental Services Department, E-mail Dec. 24, 2013.

⁵ Assuming a baseline of 4.4 pounds per day of waste generation per person (U.S. EPA, 2011), applied that to a resident population of 513,000.

⁶ Email from Fran LaSala, Environmental Manager, City of Tucson Environmental Services Department, Dec. 30, 2013.

Hauler and Facility Survey

In order to provide a more complete understanding of Tucson’s current waste and waste diversion quantities, Cascadia developed a survey to obtain disposal and recycling tonnage data by sector from private-sector haulers and privately owned recycling and disposal facilities. Prior to the distribution of this survey to haulers, ESD sent a notification letter to all targeted haulers and processors to inform them of the project and provide notification regarding the upcoming survey. A copy of this notification letter is included as Attachment 1. A list of haulers and processors surveyed may be found in [Table 2](#).

Because of the proprietary nature of waste data held by individual private sector companies, Cascadia assured survey respondents that:

- No company-specific data would be shared outside Cascadia.
- All individual tonnage information would be aggregated and reported in aggregate.

A full listing of survey questions is included as Attachment 2. Questions for haulers included: quantities of waste and recycling collected from businesses and multifamily buildings, where they took the material, whether they had access to commodity-specific recycling tonnage data, and how much construction and demolition material they collected for recycling and for disposal. Facility questions included: sources of waste and recycling received (e.g., commercial haulers, self-haul) and whether they could provide commodity-specific recycling tonnage data. Both surveys included a question about the respondent’s recommendations for increasing waste diversion of recyclables and construction and demolition materials in Tucson. Links to an online survey were distributed by email to the following organizations, which were determined, in consultation with ESD staff, to be the primary private sector waste and recycling companies hauling and processing the largest shares of material generated within Tucson City Limits.

Table 2. Companies Sent Hauler and Facility Surveys

Company	Hauler	Facility
Diggins Environmental	X	X
Friedman’s Recycling	X	X
Fairfax Companies		X
Sierra Mining and Crushing		X
Republic Services	X	
Waste Management	X	X

Cascadia received responses from three of the four haulers and from six of the eight facilities. Several respondents left many questions unanswered. Responses to the survey were used to supplement ESD data on quantities of commercial-sector waste and recycling. The hauler respondents were not able to estimate the multifamily portion of their commercial and recycling totals. Facility respondents only provided data on total waste received, rather than a breakdown of commercial and self-haul waste.

In order to provide a more complete understanding of Tucson's current waste and waste diversion quantities, Cascadia developed detailed Data Collection Plan (Attachment 3), that included the distribution of a survey to obtain disposal and recycling tonnage data by sector from private-sector haulers and privately owned recycling and disposal facilities. Prior to the distribution of this survey to haulers, ESD sent a notification letter to Diggins Environmental, Friedman's Recycling, Sierra Mining and Crushing, and the Fairfax Companies to inform them of the project and provide notification regarding the upcoming survey. Copies of these notification letters are included as Attachment 1. Letters were not sent to Waste Management or Republic Services because Cascadia staff maintained working relationships with senior representatives in those organizations, and, therefore, felt that letters from ESD were unnecessary in these instances. A complete list of haulers and processors surveyed may be found in Table 2.

Composition Estimates

Two pieces of data are necessary to develop waste composition estimates: composition percentages by material types and annual tonnage estimates. For this report, composition percentages were based on waste composition studies from other communities and modeling of the commercial waste sector. The method used for each sector is described below.

Residential: Single-family composition data were obtained from the 2003 Phoenix waste composition study.⁷ Because Tucson's residential sector includes multifamily buildings with 24 units or fewer, the residential sector profile integrates multifamily data from the 2008 California statewide study based on relative tonnage.⁸

Commercial: Commercial waste was modeled using Cascadia's "generator-based" waste composition data. The waste data used in Cascadia's waste model were collected by Cascadia in hundreds of visits to businesses and institutions. Those visits resulted in enough samples of waste to produce statistically valid estimates of composition and quantities for each generator type. The generator-based waste composition data were applied to Tucson's business sector-specific employment data. Tucson's employment data were obtained from a business list service. Because Tucson's commercial sector includes multifamily buildings with more than 24

⁷ The 2003 City of Phoenix *Characterization of Waste from Single-family Residences* is available at http://phoenix.gov/webcms/groups/internet/@inter/@dept/@pubworks/@recycle/documents/web_content/pwd_pdf_characterwaste2003.pdf.

⁸ The *California 2008 Statewide Waste Characterization Study* is available at <http://www.calrecycle.ca.gov/publications/Detail.aspx?PublicationID=1346>

units, the commercial sector profile integrates multifamily data from the 2008 California statewide study based on relative tonnage.⁹

Self-haul: Self-haul composition data were obtained from the 2008 California statewide study.

Waste Diversion Rate Comparison and Benchmarking

Tucson's estimated waste generation and waste diversion quantities were compared to data from the U.S. EPA, as well as the cities of Seattle, Portland, and San Francisco. These three cities were selected for waste diversion rate comparison and benchmarking by ESD staff, and are generally regarded as models for municipal waste diversion in the United States. Similar waste diversion comparisons were also made with the cities of Chandler and Phoenix, taking particular note of unique differences between Tucson's waste stream and those of Chandler and Phoenix. Chandler and Phoenix were selected as regional comparisons and, like Tucson, are not subject to state waste diversion mandates.

Inventory of Current Waste Diversion Activities and Organizations

Numerous public- and private-sector waste diversion efforts and organizations are active in the Tucson community and contribute to the city's waste diversion of recyclable and reusable materials. These efforts and organizations may present additional opportunities for partnership and collaboration in future efforts to expand ESD's reach and ability to divert waste. Through a survey of internet references, social media networks, and anecdotal information both from ESD staff and other Tucsonans active in various waste diversion-related organizations, Cascadia identified and developed a representative sample inventory of key waste diversion activities and organizations currently serving the Tucson community in the functional categories of education, outreach, and resources; material recycling or processing; and material reuse. This inventory is further described in the [Findings](#) section.

2.2 IDENTIFYING AND PRIORITIZING WASTE DIVERSION STRATEGIES

Cascadia and ESD identified and prioritized strategies that offer the greatest opportunities to boost waste diversion over the three- to five-year planning period. Cascadia provided ESD with a comprehensive list of waste diversion strategies drawn from articles, studies, and related projects in other U.S. communities.

ESD identified the following targeted materials that offered the most fruitful options to increase waste diversion in Tucson:

- **Clothing/textiles** (clothing and cloth scraps, household fabrics and linens, footwear, etc.)
- **Expanded polystyrene** (protective packaging such as packing peanuts and CD and [DVD](#) cases, containers such as "clamshells", trays, etc.)
- **Landscaping debris**
- **Food waste**
- **Electronic, or "e-waste"** (computers, office electronic equipment, entertainment device [electronics](#), [mobile phones](#), [televisions](#), etc.)

⁹ The *California 2008 Statewide Waste Characterization Study* is available at <http://www.calrecycle.ca.gov/publications/Detail.aspx?PublicationID=1346>

- **Construction and Demolition, or “C&D” materials** (bricks, concrete, wood, [insulation](#), gypsum, etc.)

Cascadia notes that “paper”—a significant quantity of Tucson’s overall disposed waste at 25.1% ([Figure 3](#)) is not included among this report’s list of initial materials targeted to increase waste diversion. In consultation with ESD staff, it was noted that paper (including cardboard) is currently being captured and diverted in large quantities at the city’s and private haulers’ Materials Recovery Facilities. It is believed that the vast majority of paper and cardboard not currently being diverted is originating in Tucson’s commercial sector, which has a very low recycling participation rate. Opportunities to increase recycling participation among Tucson’s businesses are addressed in several diversion strategy recommendations in this plan. It was, therefore decided to focus ESD resources on strategies that address materials not currently being captured in a systematic way.

These materials were selected because they:

- Are still being disposed in large volumes
- Have strong customer demand for associated recycling services
- Have viable waste diversion efforts that are currently self-sustaining, thereby not requiring any additional City funding or resources

3. FINDINGS

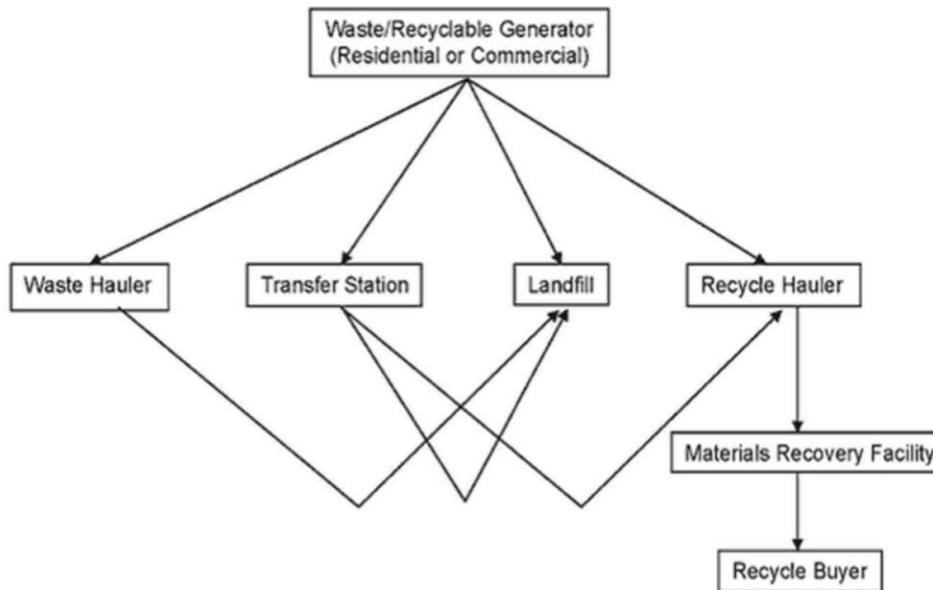
This section provides a comprehensive assessment of Tucson’s current waste disposal and diversion conditions including: material flow, waste disposal profiles, and an estimated citywide waste diversion rate. In addition, this section provides an inventory of current waste diversion activities and organizations, and a set of prioritized waste diversion strategies.

The final diversion strategies discussed in detail in this plan come as a result of Cascadia’s vetting process to analyze, filter, and refine strategies from a much larger initial set of possibilities. Evaluation took into consideration department priorities, philosophies, and preferences related to waste diversion established during early project meetings with ESD staff. Cascadia weighed the cost-benefit relationship among potential individual diversion strategies, and ranked each based on the degree of alignment with ESD priorities, the potential impact on the City’s overall diversion rate, and the degree to which the strategy could use, or augment, existing ESD diversion partnerships already in place.

3.1 MATERIAL FLOW

Waste and recycling materials generated within the City of Tucson are collected by ESD and private haulers. ESD collects waste and recycling from residents living in single-family homes and multifamily buildings with fewer than 24 units, as well as waste from approximately 3,100 businesses and recycling from about 600 businesses. Private haulers collect waste and recycling from the remainder of businesses as well as multifamily buildings with 24 or greater units. The City's waste is primarily disposed at Los Reales Landfill, though the private haulers utilize their own disposal sites as well. Self-haul customers haul waste and recycling to Los Reales Landfill and to privately operated transfer stations.

Figure 1. Material Flow of Waste and Recyclable Material in Tucson



3.2 WASTE DISPOSAL PROFILES, OVERALL AND BY SECTOR

The figures and tables in this section summarize the overall composition of waste generated by Tucson residents and businesses during calendar year 2012, and for the three sectors defined below.

- **Residential** – waste generated by single-family residences, multi-family communities with 24 or fewer units, and collected by ESD.
- **Commercial** – waste generated by businesses, institutions, and industrial entities, as well as multi-family communities of more than 24 units, and collected by ESD or a private hauler.
- **Self-haul** – waste transported to a disposal site by individuals, businesses, or government agencies that haul their own garbage; includes waste delivered by anyone other than ESD or a private hauler.

[Table 3](#) presents disposed waste quantities as collected by ESD and private haulers:

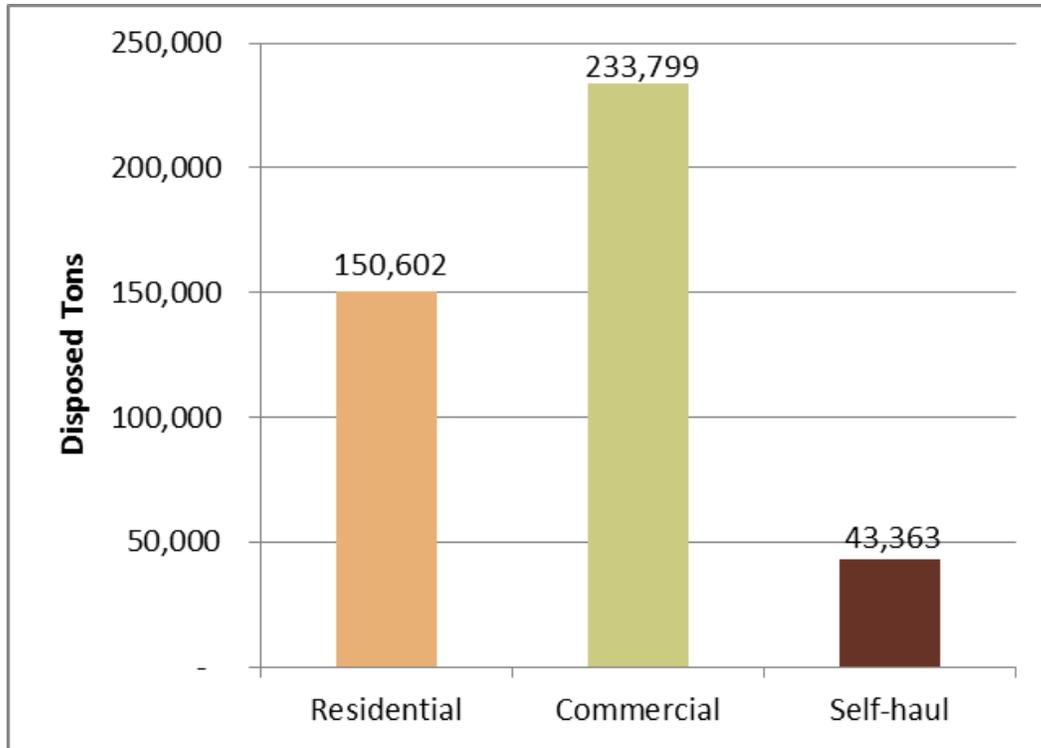
Table 3. Disposal Quantities

Disposed Waste					
Sector	Tons from City	Tons from Survey	Recycling Contamination	Total	Data Sources ¹⁰
Residential	144,237		6,365	150,602	Calendar year 2012 from LR data tab on <i>MC Data-Charts_revised (city residential)</i>
Commercial	74,035	159,142	622	233,799	Calendar year 2012 from LR data tab on <i>MC Data-Charts_revised (city commercial)</i>
Self-haul	42,973		389	43,363	LR TonnageEst_130702_FY13 (<i>Self haul tons sum</i> column), assumed 76% from city res.
Total Disposal	261,245	159,142		427,764	

¹⁰ Data provided by City of Tucson Environmental Services Department, see Attachment 7.

Figure 2 shows the annual tons of waste disposed for the residential, commercial, and self-haul waste sectors in 2012. The commercial sector was the largest overall contributor, disposing roughly 230,000 tons, or about 55% of Tucson's total waste.

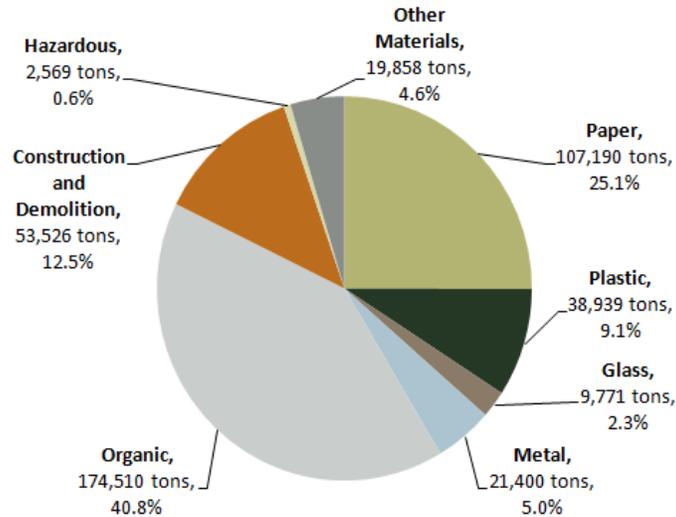
Figure 2. Tucson Annual Waste Disposal by Sector, 2012



A pie chart for each sector is presented below, and includes waste composition for eight Material Classes: Paper, Plastic, Glass, Metal, Organic, Construction and Demolition, Household Hazardous Waste, and Other Materials. Detailed composition results for the City's overall waste stream and the three sectors are included as tables in Attachment 4.

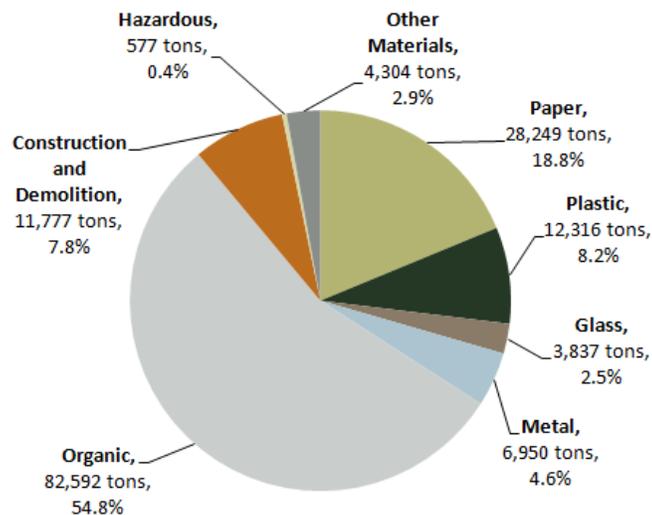
Figure 3 provides an overview of the composition of all waste generated in the City of Tucson, including residential, commercial, and self-haul wastes. As shown, organic waste—including *food* (18.7%) and *yard debris* (12.1%) among other organic materials—made up about 41% of the total waste disposed. Paper composed a quarter of the overall waste, and construction and demolition waste made up almost 13%.

Figure 3. Overview of Tucson's Overall Waste Composition, 2012



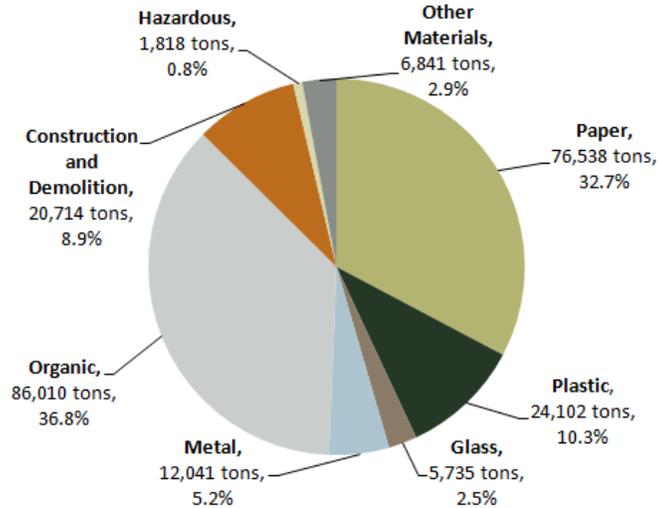
As shown in Figure 4, organic waste is estimated to make up over half of Tucson’s residential sector waste and is composed, predominantly, of *yard debris* (24.5%) and *food* (17.6%). Paper is the next largest material class at almost 19%. *Mixed paper* and *textiles*, both recyclable material categories, each made up about 6% of residential waste. Based on data derived from waste characterization studies completed in other communities, Cascadia estimates that the municipal average for textiles disposed is about 4-6% by weight.

Figure 4. Overview of Tucson's Residential Waste Composition, 2012



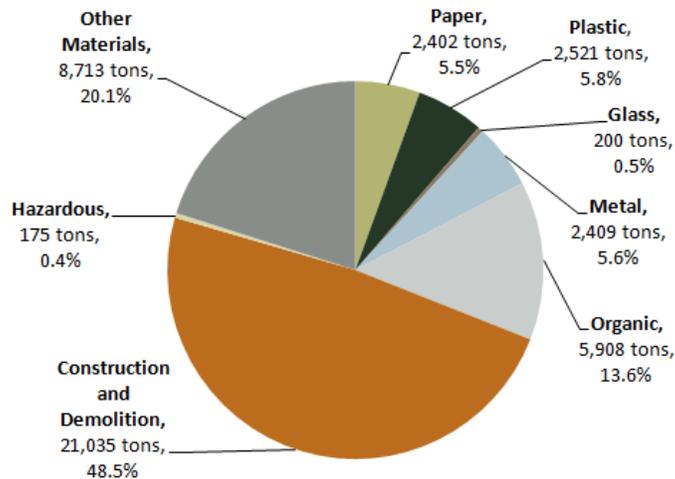
When combined, organic waste and paper made up nearly 70% of the commercial sector's waste ([Figure 5](#)). The largest material category in the organic waste class was *food* (22.6%). *Mixed paper* (8.7%) and *cardboard/Kraft paper* (6.3%), both recyclable categories, were prominent materials in the paper class.

Figure 5. Overview of Tucson's Commercial Waste Composition, 2012



Unlike Tucson's other waste sectors, the largest material class in the self-haul sector's waste was estimated to be construction and demolition waste (48.5%), as shown in [Figure 6](#). Prevalent materials in the construction and demolition waste class included *lumber* (23.2%) and *rock, concrete, ash, soil, & fines* (12.0%). Other materials (20.1%) was the next largest material class and included *bulky items* (9.2%) (e.g., couches, mattresses) and *other MSW* (10.8%).

Figure 6. Overview of Tucson's Self-Haul Waste Composition, 2012



3.3 DIVERSION QUANTITIES

This section presents estimated diversion (recycling) quantities and the diversion rate for the City of Tucson for calendar year 2012.

Diversion Quantities

Total calendar year 2012 citywide recycling quantities are presented in [Table 4](#) below.

Table 4. Total Diversion Quantities, Fiscal Year 2013

Material Type	Annual Tons	Percent (by weight) ¹¹
Newspaper and Other Paper	18,874	40.0%
Cardboard and Other Paper	12,128	26.7%
Other Mixed Glass	10,376	22.0%
PET Bottles	2,071	4.4%
Tin	1,086	2.3%
Other Plastics	943	2.0%
HDPE Pigmented Bottles	615	1.3%
HDPE Natural Bottles	545	1.2%
Aluminum	499	1.1%
Total	47,138	100%

[Table 5](#) presents recycling commodities, *by type of material*, collected by ESD and private haulers:

Table 5. Diversion Quantities

Sector	Tons from City	Tons from Survey	Recycling Contamination	Total	Data Sources ¹²
Residential	33,902	N/A	6,365	27,537	Files from Fran (<i>Re-Co MRF data</i>) and Jeff (<i>wm monthly</i>) on 12/23
Commercial	N/A	15,227	N/A	15,227	Calendar year 2012 from Cascadia survey, commercial and multifamily reported recycling
City Commercial	3,312	N/A	622	2,690	Files from Fran (<i>Re-Co MRF data</i>) and Jeff (<i>wm monthly</i>) on 12/23
NRCs	2,073	N/A	389	1,684	Files from Fran (<i>Re-Co MRF data</i>) and Jeff (<i>wm monthly</i>) on 12/23
Total Diversion				47,138	
			Contamination %	18.8%	<i>Source: Recycling tons FY-2013_12-23-13</i>

¹¹ May not sum to 100% due to rounding.

¹² Data provided by City of Tucson Environmental Services Department, see Attachment 7.

Diversion Rate

The **diversion rate** is defined as the amount of recycling as a percentage of the total waste generated, and is calculated as follows.¹³

$$\text{Diversion Rate (\%)} = \frac{\text{Recycling}}{\text{Waste Disposal} + \text{Recycling}} = \frac{47,138 \text{ tons}}{427,764 \text{ tons} + 47,138 \text{ tons}} = \mathbf{9.9\%}$$

As shown above, the calendar year 2012 diversion rate for the City of Tucson is approximately 10%. This estimate was calculated by compiling data from several sources, some of which were only able to provide their best guesses, and could be improved with better tracking of disposal and recycling quantities. The recommendations section offers potential solutions for more comprehensive and accurate data tracking and reporting in the future.

Municipal Comparisons

At ESD's direction, Cascadia analyzed diversion rates and associated calculations, as well as other key characteristics of selected communities in the Western U.S. in order to benchmark Tucson's current diversion rate and highlight key differences that may impact performance.

Key characteristics in top-performing cities such as Seattle, Portland and San Francisco include, but are not limited to:

- Objective diversion goals established by the community's solid waste management entity
- Commitment and support of elected officials
- Mandatory recycling programs
- Graduated rate structures to incentivize recycling and waste reduction
- Requirements for private haulers and processors to provide certain services and to report results (willingness to franchise exclusive rights to control service delivery and achieve objectives)

As [Table 6](#) below shows, a direct comparison of diversion rates between communities is difficult at best. These rates are based on varying degrees of regulation, enforcement and compliance, materials accepted, disposal fees, and calculation methods. As Tucson is well aware, mandatory diversion policies in other Western States creates an obviously different environment from which to establish, manage, and assess diversion goals and related achievements.

¹³ This rate is typically referred to as a *recycling rate* while a *diversion rate* is frequently defined as including other types of diversion beyond recycling. For instance, the Environmental Protection Agency defines diversion as "the prevention and reduction of generated waste through source reduction, recycling, reuse, or composting." <http://www.epa.gov/greeningepa/waste/>

Table 6. Municipal Diversion Comparisons for Selected Western U.S. Communities

Municipality	Population	Disposal Fees	2012 Overall Diversion Rate	Public Diversion Goals	Notes Regarding Diversion Calculations
Chandler, AZ	236,123	\$38-\$40/ton depending on materials	22%	n/a	Tonnage and diversion estimates represent only the single-family residential stream.
Phoenix, AZ	1,445,632	\$38.25/ton	13%	40% by 2020 ¹⁴	
Portland, OR	603,106	\$89.53/ton	63% ^{Error! bookmark not defined.}	75% by 2015 ¹⁵	
San Francisco, CA	805,235	\$147.13/ton	80% ¹⁶	Zero Waste by 2020	
Seattle, WA ¹⁷	608,660	\$145/ton ¹⁸	55.7%	60% by 2015 70% by 2022	Excludes C&D material and other special wastes such as HHW, MRW
Tucson, AZ	519,000	\$32-\$37/ton depending on covered vs. uncovered loads	9.7%	N/A	

Arizona presents very different challenges than its neighbors along the West Coast with regard to diversion environment. Not only the lack of diversion mandates, but also generally low public- and private-sector disposal fees across the state create a situation where diversion efforts are truly voluntary, and often lack direct financial incentive. Even with the lack of “top-down” recycling and diversion mandates, however, many Arizona governments in the state also set goals for recycling, plan waste reduction and diversion efforts, and report a wide variety of results. The result is often the creation of goals based in principle, or around specific areas of community interest, and (often) less-quantifiable results in achieving such goals are acceptable. For instance, [Figure 7](#) illustrates a sampling of diversion goals and activities currently active among urban and suburban communities in the greater Phoenix area.¹⁹

¹⁴ Reid, Betty. The Arizona Republic. “Phoenix plans a heap of recycling education”. April 2, 2013.

¹⁵ “Best practices for Local Government Solid Waste Recycling, Diversion from Landfill and Waste Reduction”, December 2011, Prepared by Mecklenburg County Land Use & Environmental Services Agency, Solid Waste Division.

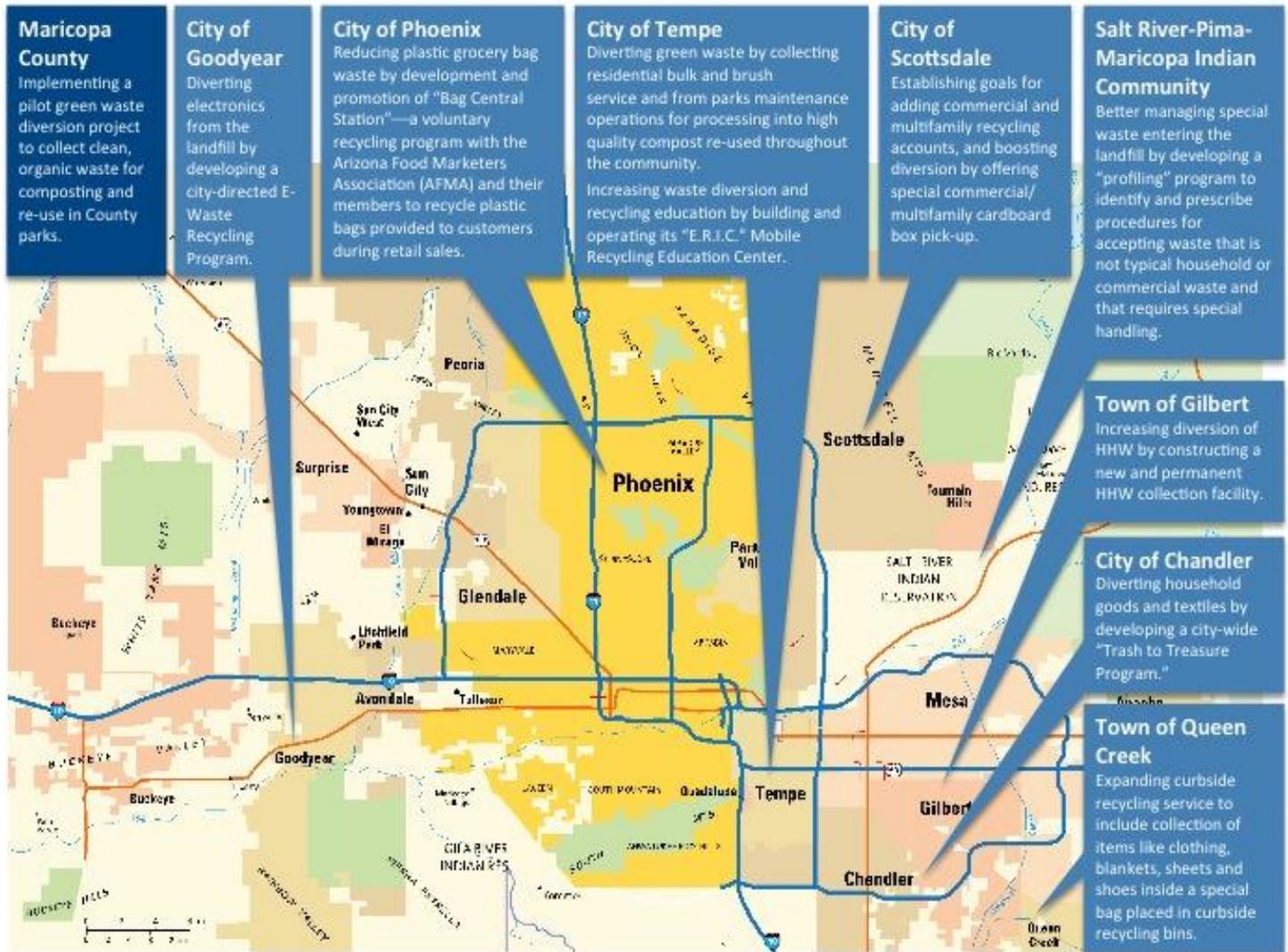
¹⁶ “San Francisco’s Famous 80% Waste Diversion Rate: Anatomy of an Exemplar”, December 6, 2013, <http://discardstudies.wordpress.com/2013/12/06/san-franciscos-famous-80-waste-diversion-rate-anatomy-of-an-exemplar/>

¹⁷ <http://www.seattle.gov/Util/Documents/Reports/SolidWasteReports/index.htm>

¹⁸ <http://www.seattle.gov/util/MyServices/Recycling/DumpTransferStation/Rates/index.htm>

¹⁹ Maricopa Association of Governments. *Solid Waste Best Practices in the MAG Region*. December 2012. http://www.azmag.gov/Documents/SWAC_2013-01-18_Solid-Waste-Best-Practices-in-the-MAG-Region-Dec-2012.pdf

Figure 7. A Sampling of Local Government-Directed Diversion Efforts in the Greater Phoenix Area



3.4 INVENTORY OF CURRENT DIVERSION ACTIVITIES AND ORGANIZATIONS

When evaluating Tucson's diversion rate, it is important to note that numerous additional waste prevention, material reuse, and recycling activities are occurring throughout the community and not fully counted in the current rate. However, these efforts contribute directly to the City's diversion of recyclable and reusable materials, and prevent additional material from being disposed and landfilled.

In surveying and evaluating public and private sector waste diversion efforts and organizations active in the Tucson community, Cascadia looked to a very significant local resource: Tucson Clean and Beautiful.

Tucson Clean and Beautiful (TCB) is an incorporated 501(c)3 non-profit organization that offers a variety of programs designed to improve Tucson and Eastern Pima County's environment through initiating educational and participatory programs. TCB operates with a minimal staff overseeing its programs. Community partners including individual volunteers, local government (including City of Tucson government), businesses, and other non-profit organizations are all an integral part of the services that TCB provides to the local community.²⁰

Figure 8. Tucson Clean & Beautiful's "Reduce-Reuse-Recycle Directory"

The screenshot shows the Tucson Clean & Beautiful website's 'Recycling Directory' page. The main content area is titled 'Appliances' and contains a table listing various organizations that accept appliances for recycling. The table includes columns for Name, Description, Address, Phone, and Web/Email links.

Name	Description	Address	Phone	Web/Email
American Retroworks-West, Inc.	Recycling and disposal management services for computers, televisions, telephones, microwaves, appliances, printer cartridges and many other types of electronics. Fees may apply for collection and recycling of certain items.		(520) 477-8919	Web Email
Appliance Masters		902 W. Prince Rd. Suite B	(520) 888-7814	
Appliance Plus, Inc./Vintage Appliances		3262 E. Columbia St.	(520) 326-6849	Web
Arizona Recycles LLC	Purchases aluminum cans, appliances, auto parts, car batteries, machinery and many other types of scrap metal.	902 E. Hughes Access Rd.	(520) 573-7331	Web
Beacon's Value Village Thrift Store		2700 N. Stone Ave.	(520) 792-1454	Web
Casa de los Niños Thrift Shop	Accepts working, gently used appliances along with clothing, housewares, toys and more.	1302 E. Prince Rd.	(520) 325-2573	Web
Cathey's Vac and Sew		5701 E. Speedway Blvd.	(520) 721-4000	Web
Cathey's Vac and Sew		8700 N. Oracle Rd.	(520) 797-7177	Web
Catholic Community Services of Southern Arizona - Pio Decimo Center	Accepts clothing and household goods, food as well as other items for redistribution to those in need.	848 S. 7th Ave.	(520) 624-0551	Web
City of Tucson Environmental Services/Do More Blue	Appliances and other scrap metal items are NOT accepted in Blue Barrels for recycling, but are collected during twice-yearly Brush and Bulky collection or can be recycled at Los Peñas Landfill. Call for details.		(520) 791-5000	Web Email
Country Fair White Elephant Shop	Accepts working appliances, antiques and collectibles, cameras, clothing, computers, furniture, housewares, hardware, jewelry and toys. Merchandise offered for resale with proceeds to benefit schools and community organizations.	601 N. La Canada Dr.	(520) 625-4119	Web
Desert Metals Recycling	Purchases aluminum cans and scrap aluminum, brass, copper, stainless steel, batteries, appliances, tin and steel.	3119 E. Pennsylvania St.	(520) 741-0608	Web
Golden Goose Thrift Shop	Accepts working appliances, furniture, books and magazines, art and antiques, and many	15970 N. Oracle Rd.	(520) 825-9101	Web

²⁰ Tucson Clean and Beautiful. *Mission and History*. <http://www.tucsoncleanandbeautiful.org/donate-contact/mission-and-history/>

Of particular note is Tucson Clean and Beautiful’s “Reduce-Reuse-Recycle Directory,” commonly referred to as the “Recycling Directory” (Figure 8).²¹ It is the premier community-driven information source of recycling, waste prevention, and other community environmental resources available in the Tucson and Pima County metro area. The Recycling Directory is designed for members of the public to identify local businesses and organizations that will accept items for re-use or recycle of materials—including perceived “difficult to recycle” items. Users may select from a list of over 50 categories of materials, and link to hundreds of local waste diversion opportunities. Through a survey of TCB’s Recycling Directory resource directory, other social media networks, and through anecdotal information both from ESD staff and other Tucsonans active in various waste diversion-related organizations, Cascadia identified and catalogued a representative sample of waste diversion activities and organizations serving the Tucson community in the following functional categories:

- Education, outreach, and resources
- Material recycling or processing
- Material reuse

Cascadia is working with ESD to ensure these existing waste diversion activities and partnerships are integrated into further waste diversion efforts in the future.

Examples of Tucson area-based waste diversion activities are included in Attachments 5 and 6. Attachment 5 provides a summarized listing of diversion activities that are community-driven, while Attachment 6 provides a listing of diversion activities facilitated by the City of Tucson and other local governments. Organizations noted in these attachments represent a small portion of an enormous list of waste diversion actions taking place across the Tucson Area and in Eastern Pima County. Cascadia chose to highlight these particular organizations believing they represent the greatest, and most immediate, opportunities for partnership (or enhancement of existing partnership) to realize ambitions for near-term waste diversion.

²¹ Tucson Clean and Beautiful. *Recycling Directory*. <http://www.tucsoncleanandbeautiful.org/recycling-directory/>

3.5 PRIORITIZED WASTE DIVERSION STRATEGIES

This section presents ESD prioritized waste diversion strategies and their relative impact in terms of diversion, cost effectiveness, and alignment with City goals. Complete details of strategies summarized in [Table 7](#) are reflective of materials identified by ESD as high priority, and are discussed in detail in Attachment 8, including:

- **Clothing/textiles** (clothing and cloth scraps, household fabrics and linens, footwear, etc.)
- **Food waste**
- **Electronic, or “e-waste”** (computers, office electronic equipment, entertainment device [electronics](#), [mobile phones](#), [television sets](#), etc.)
- **Construction and Demolition, or “C&D”** (bricks, concrete, wood, [insulation](#), gypsum, etc.)
- **Expanded polystyrene** (protective packaging such as packing peanuts and CD and [DVD](#) cases, containers such as "clamshells", trays, etc.)
- **Landscaping debris**

These materials were selected because they:

- Are still being disposed in large volumes
- Have strong customer demand for associated recycling services
- Have viable waste diversion efforts that are currently self-sustaining, thereby not requiring any additional City funding or resources

In [Table 7](#), each strategy is introduced, and ranked low, moderate, or high with regard to alignment with City goals, waste diversion, and presence of key partners. A detailed discussion and analysis of each strategy may be found in Attachment 8.

City Goals: This rating category is based on the City’s expressed preferences for the following three principles: 1) Use, or enhanced use, of existing waste diversion tools; 2) Encouragement of diversion that is self-directed and voluntary, rather than City-mandated or City-managed; and 3) Use of existing financial resources, or shifting of existing resources, versus adding to the Department’s budget.

Diversion: This rating category is based on capture rate data, diversion rate data, or, when data was unavailable, Cascadia’s 20+ years of experience with waste and recycling issues. Capture rates indicate how much of recyclable material is actually being recycled. For the data presented in this section, capture rates apply to *subsets* of materials (e.g. textiles, organics, and “bulky” items). Diversion rates, on the other hand, indicate how much *overall* material is diverted from disposal. The rankings of low, moderate, and high are associated with *capture* rates of <10%, 10-50%, and >50%, respectively. The rankings of low, moderate, and high are associated with *diversion* rates of <2%, 2-10%, and >10%, respectively.

Key Partners: This category is based on the existence of, or potential for, local partnerships. The ranking of “low” is associated with no available partners; “moderate” is associated with the availability of potential partners or available resources; and “high” is associated with either potential or existing partners.

Table 7. Assessment of Waste Diversion Strategies.

Individual strategies are discussed and analyzed in detail in Attachment 8.

Priority Material	Strategy	City Goals	Diversion	Key partners
Clothing/textiles	Host community textile recycling events	High	Moderate	Moderate
	Develop a drop-off textile collection program	Moderate	High	High
	Join the Council for Textile Recycling (Advertise)	Moderate	Moderate	High
	Include textile recycling curriculum in schools	Low	Moderate	Low
Organic Waste	Operational support of Compost Cats	High	High	High
	Food waste prevention social media campaign	High	Moderate	Moderate
	Backyard composting social media campaign	High	Low	Moderate
	Provide curbside pick-up of organic waste	Moderate	Moderate	Moderate
Electronic waste	Targeted Promotion - Tucson Clean and Beautiful	High	Low	High
	Collect self-haul e-waste	Moderate	Low	Moderate
Construction & Demolition	Provide salvage and recycling information through industry specific outlets	Moderate	Moderate	Low
	Create closed loop partnerships with local recyclers to support City-owned building or demolition	Moderate	Low	Moderate
	Required recycling for City-owned building or demolition	Low	Unknown	High
	Utilize existing social media and website marketing tools and partnerships	High	Low	High
Polystyrene	Develop relationships with local recyclers	High	Low	Moderate
	Support alternative packaging options	Moderate	Low	High

4. RECOMMENDATIONS – TUCSON’S WASTE DIVERSION ROADMAP

Preliminary recommendations are listed below, and are based on the research conducted for this project. These recommendations are intended to facilitate more efficient and economically viable methods for achieving and measuring greater waste diversion rates.

- **Define ESD’s role for connecting, promoting, and tracking waste diversion** – ESD appears best situated to become a central point or portal for waste diversion activities taking place within Tucson. Define the department’s role as a central portal that connects customers to resources, promotes existing and emerging waste diversion opportunities, and shares key data and metrics including progress over time.
- **Require waste and recycling collectors, processors, and non-profit organizations receiving trash credits to report waste and recycling quantities to ESD** – Chapter 15 of the Tucson City Code provides an exemption of fees for charities engaging in recycling activities. Additionally, it establishes a “Litter Fee and Permit Program” for waste haulers providing service within city limits. Neither the fee exemption or Litter Fee Permit Program have provisions for entities to report the amount of material recycled, or in the case of waste haulers, the amount of trash and recyclable material collected. Establishing such requirements would provide ESD with critical information necessary to establish data relating to waste generation, sector-specific quantities wherever feasible (residential, commercial, multifamily, self-haul), and waste diversion rates. Reports should be submitted at least annually.
- **Consider conducting a waste characterization study** – A waste characterization study typically involves “gatehouse surveys” that are conducted at disposal and recycling facilities to better estimate the quantities and types (organics, recyclables, compostable, etc.) of waste entering the facility. With the exception of ESD’s data, private haulers and processors provided best estimates for waste and recycling quantities for this plan. Most of these companies do not track City of Tucson-specific or sector-specific waste and recycling quantities. Additionally, the waste composition profiles developed for this plan are modeled based on data from Western U.S. communities with similar waste streams. A waste characterization study would provide more representative quantity and composition data and a more accurate waste diversion rate.
- **Consider further development of financial incentives for recycling and waste reduction** – Currently, ESD offer residents smaller trash containers at a reduced price. Commercial customers receive discounted rates for recycling container service. Both opportunities encourage recycling and waste diversion through reduction of trash collection fees. Additional incentives through the development of sustainable customer rate structures should be explored.
- **Continue efforts to increase commercial recycling** – Use knowledge and tools gained from Tucson’s Commercial Waste Audit program (performed in conjunction with Cascadia over a 30-month period in 2010-2013). Continue to perform targeted waste audits, inform business owners about the importance, ease, and financial benefits (if applicable) associated with adding recycling service to their existing ESD trash collection account.

- **Continue partnerships with University of Arizona (U of A) to bolster and promote waste diversion to students and community at large** – The city and the U of A entered into an Intergovernmental Agreement for composting of activities in January 2014. Initially, these efforts will benefit the Tucson Zoo and a handful of food service providers. This is a small step in engaging the U of A. Additional opportunities could include training students to serve as recycling ambassadors to connect residents and businesses with resources and services. Popular Wildcat sports figures could promote recycling and engage and educate fans at games through public service announcements and game-day activities.
- **Focus ESD resources on materials still being disposed in large volumes that are not currently being captured in a systematic way, that have strong customer demand for recycling services, and that have associated waste diversion efforts that are self-sustaining, thereby not requiring any additional city funding or resources.** The following materials appear to present the greatest opportunities for diversion as measured against these criteria: clothing/textiles, expanded polystyrene, landscaping debris, food waste, electronic waste, and construction and demolition materials.
 - **Clothing/textiles** (clothing and cloth scraps, household fabrics and linens, footwear, etc.) – Promote existing Tucson-based reuse and recycling opportunities to residents and businesses using free materials available through organizations like SMART and Community Recycling. Engage collectors and other key stakeholders to bolster efforts.
 - **Expanded polystyrene** (protective packaging such as packing peanuts and CD and [DVD](#) cases, containers such as "clamshells", trays, etc.) – Reducing the amount of polystyrene in the landfill will not increase waste diversion tons since the material is highly voluminous. However, there is a strong and consistent customer demand for waste diversion opportunities involving expanded polystyrene. Promoting existing waste diversion options to residents and businesses, such as returning packing peanuts to third-party shippers and recycling block foam with local recyclers, offers an inexpensive solution to a consistent and environmentally important issue.
 - **Landscaping debris and food waste** – continue to building out partnership with University of Arizona Compost Cats and Speedway Landfill to promote, collect, and process organic wastes into compost. As possible, assistance to the Compost Cats as they move toward a self-sustaining business model, as planned.
 - **Electronic waste, or “e-waste”** (computers, office electronic equipment, entertainment device [electronics](#), [mobile phones](#), [television sets](#), etc.) – Promote the many Tucson-based e-waste collectors, such as big box retailers and non-profits; engage key collectors and stakeholders to strengthen efforts.
 - **Construction and demolition** (bricks, concrete, wood, [insulation](#), gypsum, etc.) – Promote existing salvage and reuse efforts, such as the Builder’s Exchange/ReSupply; “walk the talk” by pushing for more waste diversion to occur as part of city-owned construction and development projects.
- **Promote the “When in doubt, recycle it” message as a cross-sector, omni-material diversion strategy** – Cascadia took particular note during ESD’s Commercial Waste Audit project (August 2010 - January 2013) that most people in Tucson tend to throw an item in the trash if they have

any question about whether or not the item is recyclable. This was learned to be the case across both the commercial and multi-family sectors, and is thought to be the case among a large percentage of ESD's residential customers. During the Commercial Waste Audit project outreach, ESD sought to communicate the message to its customers of, "when in doubt, recycle it"—or, in other words, if you aren't sure if an item is recyclable, put it in your blue bin. This is counter to the long-standing nationwide municipal waste mantra, "when in doubt, throw it out". When an ESD customer was made aware of this philosophy, and, in combination, learned about Tucson's materials recovery facility (MRF) and how it works to remove non-recyclable "contamination," recycling volumes coming from that customer increased notably. Being that single-family residential is ESD's largest sector/customer base, it's reasonable to expect that if the "when in doubt, recycle it" philosophy is promoted to ESD residential customers (even *after* the MRF takes out contamination) the city's residential recycling rate would likely increase—potentially significantly. The same could be done with ESD's commercial and multi-family customers. This strategy relies on a very simple and concise public message that may be fully implemented using existing ESD funding and mechanisms of social media outreach, water bill inserts, bus stop bench and recycle truck advertisements, etc. The "When in doubt, recycle it" message targeted to ESD's existing residential customer base has the potential to increase Tucson's residential recycling rate by an additional 10% on the low-end to an additional 20% or more on the high end. Furthermore, the effort may easily be extended to ESD's commercial and multi-family customers.

Establishing Tucson's Diversion Goal

In order to establish a waste diversion (or recycling) rate goal for the City of Tucson (and to know if that goal is being achieved), it is necessary to understand, to the greatest extent possible, the amount of solid waste currently being generated in the city, the amount of solid waste being diverted through recycling and other diversion activities operating in the community, and how much waste is being reduced through source reduction activities.

This Waste Diversion Plan and Roadmap has established baseline estimates for waste disposal and recycling quantities for Tucson. However, the resulting diversion rate estimate relies upon incomplete data. For example, private haulers and processors do not typically track City of Tucson-specific or sector-specific waste and recycling quantities. Additionally, the waste composition profiles developed for this plan are modeled based on data from Western U.S. communities with similar waste streams.

Therefore, Cascadia has recommended in this report ([Section 4](#)) that the City of Tucson consider conducting a waste characterization study to better estimate the quantities and types (organics, recyclables, compostable, etc.) of waste. A waste characterization study would provide more accurate representative quantity and composition data, and will allow for the calculation of a more accurate diversion rate. Tucson can also begin developing a set of higher quality and more complete data over time by implementing Cascadia's recommendation for the City of Tucson to require waste and recycling collectors, processors, and non-profit organizations receiving trash credits to report waste and recycling quantities to ESD.

Until such time when ESD has access to more accurate citywide waste data, Cascadia does not recommend that Tucson establish a waste diversion goal based on a specific percentage (e.g., the City of Phoenix' 40% diversion by 2020 campaign).²²

Rather, we are recommending that the City of Tucson establish a goal based upon a range of diversion efforts focusing on those individual recommendations that the City chooses to pursue, and the corresponding resulting impact on the overall diversion rate.

The following [Table 8](#) illustrates the full diversion potential for each of the targeted materials in this plan. Further analysis is needed to determine reasonable capture rates for each material and strategy, and to develop a final diversion rate goal.

[Table 9](#) illustrates future diversion projections for the City of Tucson, based on 10%, 20%, and 30% levels of targeted materials successfully diverted.

Table 8. Target Materials, Portion of Overall Tucson Disposed Waste

Targeted Materials	Percent	Annual Tons	Notes
Textiles	4.5%	19,316	Clothing and cloth scraps, household fabrics and linens, footwear, etc.
Electronic Waste*	0.4%	1,792	Computers, office electronic equipment, entertainment device electronics , mobile phones , television sets , etc.
Organics	30.8%	131,833	Divertible yard debris and food waste
Construction & Demolition	11.0%	47,157	Bricks, concrete, wood, insulation , gypsum, etc.
Expanded polystyrene packaging*	0.4%	1,915	Protective packaging such as packing peanuts and CD and DVD cases, containers such as "clamshells", trays, etc.
	46.7%	202,013	

Note: Percentages of electronic waste and expanded polystyrene are not estimated in waste disposal profiles, but were estimated based on averages from Cascadia's inventory of data from waste characterization studies for other municipalities: 2011 King County Waste Characterization and Customer Survey Report, King County Waste Monitoring Program, Cascadia Consulting Group, October 2012-2012; Commercial and Self-haul Waste Streams Composition Study Final Report, Seattle Public Utilities, Cascadia Consulting Group, 2013.

²² "Phoenix plans a heap of recycling education", Betty Reid, The Arizona Republic, April 2, 2013

Table 9. Future Diversion Projections

Overall Disposal	427,764		
Overall Diversion	47,138		
Total Generation	474,901		
Additional % Diverted of Targeted Materials (Table 2)	10%	20%	30%
New Diversion	20,201	40,403	60,604
New Total Diversion	67,339	87,540	107,741
New Diversion Rate	14.2%	18.4%	22.7%

Note: Actual tonnage is not called-out for *Electronic Waste* and *Polystyrene (e.g., Styrofoam®)* quantities in Tucson. Modeled tonnages are also unavailable by modeling national data. Diversion estimates here are calculated based on tonnage (and reduction/diversion of tonnage) in the material categories of *Other Metal* and *Other Plastic*, respectively.

Summary and Conclusion

To put it in words, if the City of Tucson could commit to diverting *just 10% of just the materials in Table 5*, it could increase its overall waste diversion rate by 4.3% (from 9.9% to 14.2%). Again, for comparison, the City of Phoenix self-reported its FY 2013 overall diversion rate at 13%.

Furthermore, if the City of Tucson committed to diverting 20%, 30%, or more of *only these materials*, its overall diversion rate could, very realistically, reach upwards of 23%.

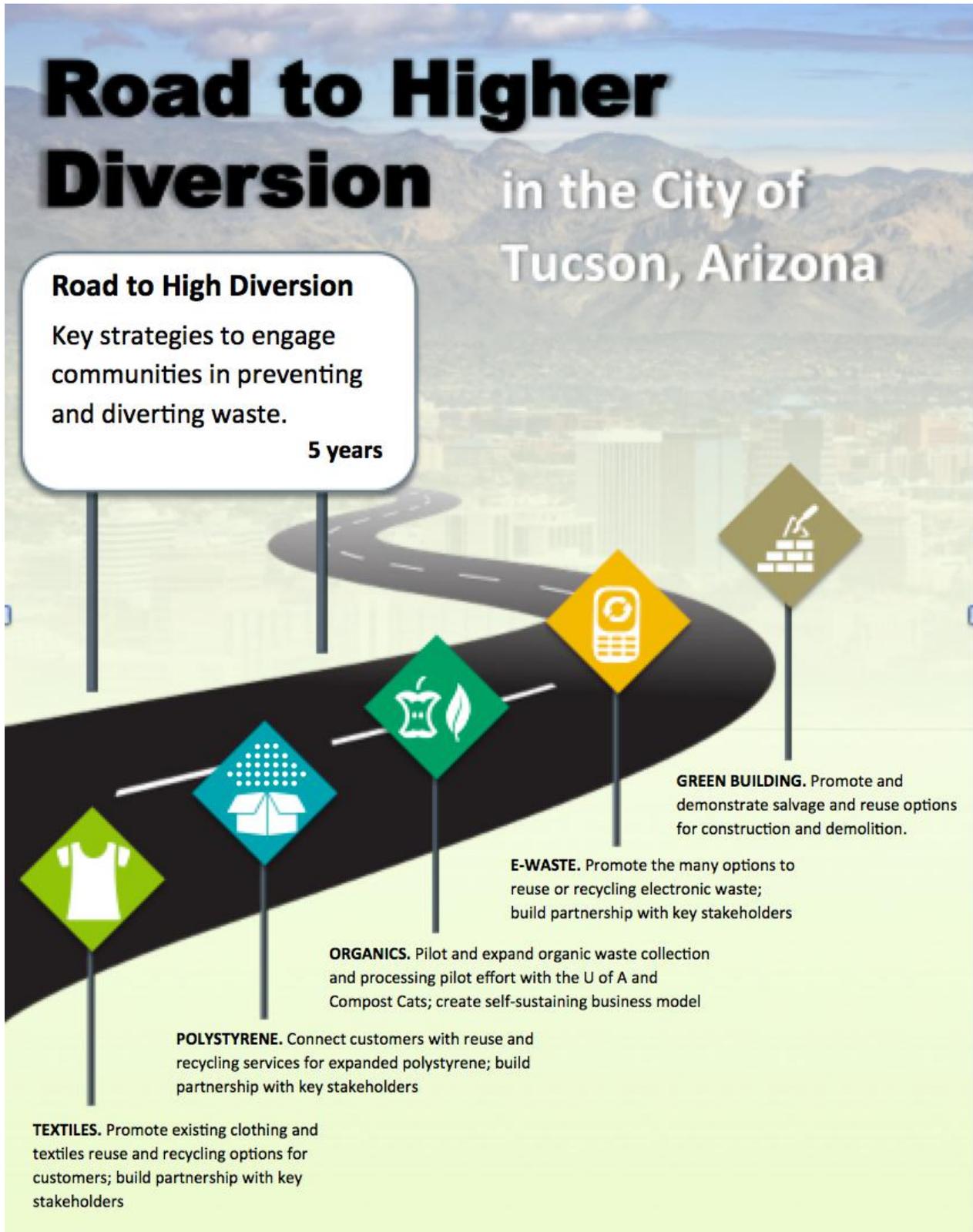
It should also be noted that if ESD was equipped with complete and accurate data from all waste hauling and processing sources operating in the City of Tucson, Cascadia believes that even higher rates of diversion will be achievable—if not only for the possibility that Tucson’s diversion rate baseline (established in this report) may actually be somewhat, or even notably higher than 9.9%.

This achievement, at whichever level of effort, would only be augmented further by a general increase in the residential recycling rate resulting from promotion of “When in doubt, recycle it” campaign to ESD residential customers. As stated earlier in Section 4, such a campaign has the potential to increase Tucson’s residential recycling rate by an additional 10% on the low end, to an additional 20% or more on the high end. Furthermore, the effort may easily be extended to ESD’s commercial and multi-family customers.

The City of Tucson has developed leading diversion programs and is already developing new partnerships to further increase diversion across the city. The City is highly motivated and has dedicated leadership in place to realize dramatic increases in waste diversion in the future. There are ample waste diversion strategies, outreach opportunities, and partnerships ready and available to the city to further realize its vision to boost diversion in the future.

The information provided in this *Waste Diversion Plan and Roadmap* is intended to inform and motivate, bring forward important considerations for future study, and launch efforts from within the Environmental Services Department— supported by the Mayor and Council—that will establish Tucson as a leader in waste diversion in Arizona and beyond.

Figure 9. Road to Higher Diversion in the City of Tucson, Arizona



ATTACHMENTS

Attachment 1. Private Hauler/Processor Survey Notification Letter

Attachment 2. Private Hauler/Processor Survey Questions

Attachment 3. Waste Quantity and Composition Data Collection Plan

Attachment 4. Detailed Waste Composition Tables

Attachment 5. Tucson Area Waste Diversion Activities (Table)

Attachment 6. Tucson Area Government-Operated Waste Diversion Activities (Table)

Attachment 7. City of Tucson Raw Data (Table)

Attachment 8. Prioritized Waste Diversion Strategies (Detail)

NOTE: Per ESD's request, all Attachments associated with this report were provided as individual PDF documents, rather than including them in the master document. For this reason, references made to Attachments are not hyperlinked, as they are for other types of references such as tables and figures.

**ATTACHMENT 1- PRIVATE HAULER/PROCESSOR
SURVEY NOTIFICATION LETTER**



CITY OF
TUCSON

ENVIRONMENTAL
SERVICES

November 4, 2013



Diggins Environmental
Don Feitl
1500 E. 17th Street
Tucson, AZ 85719

Dear Mr. Feitl:

The City of Tucson, Environmental Services Department (ES) is working with Cascadia Consulting Group to collect and analyze Tucson's waste disposal and diversion data. The information generated from the data analysis will assist ES in identifying future waste diversion opportunities for Tucson.

Representatives from Cascadia may be contacting you in the coming weeks to ask for your assistance. In particular, they will be seeking total annual tonnage and annual tonnage by sector (residential, multi-family, commercial) for waste collected, disposed, recycled, transferred out of Tucson, or otherwise diverted from Tucson-area landfills.

All data obtained by Cascadia will be used in aggregate and not associated with individual haulers or facility operators. Please contact Francis LaSala at (520) 837-4055 or fran.lasala@tucsonaz.gov if you have any questions or concerns regarding this letter or the work being performed by Cascadia.

I would like to thank you in advance for your cooperation in this effort.

Very truly yours,

Andrew H. Quigley
Director

AHQ/FL/nr





November 4, 2013

CITY OF
TUCSON

ENVIRONMENTAL
SERVICES

Friedman's Recycling
Tom King
1825 W. Price Street
Tucson, AZ 85705

Dear Mr. King:

The City of Tucson, Environmental Services Department (ES) is working with Cascadia Consulting Group to collect and analyze Tucson's waste disposal and diversion data. The information generated from the data analysis will assist ES in identifying future waste diversion opportunities for Tucson.

Representatives from Cascadia may be contacting you in the coming weeks to ask for your assistance. In particular, they will be seeking total annual tonnage and annual tonnage by sector (residential, multi-family, commercial) for waste collected, disposed, recycled, transferred out of Tucson, or otherwise diverted from Tucson-area landfills.

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I would like to thank you in advance for your cooperation in this effort.

Very truly yours,

Andrew H. Quigley
Director

AHQ/FL/nr





CITY OF
TUCSON

ENVIRONMENTAL
SERVICES

November 4, 2013



Fairfax Companies Speedway Landfill
Jason Tankersly
7301 E. Speedway Blvd
Tucson, AZ 85710

Dear Mr. Tankersly:

The City of Tucson, Environmental Services Department (ES) is working with Cascadia Consulting Group to collect and analyze Tucson's waste disposal and diversion data. The information generated from the data analysis will assist ES in identifying future waste diversion opportunities for Tucson.

Representatives from Cascadia may be contacting you in the coming weeks to ask for your assistance. In particular, they will be seeking total annual tonnage and annual tonnage by sector (residential, multi-family, commercial) for waste collected, disposed, recycled, transferred out of Tucson, or otherwise diverted from Tucson-area landfills.

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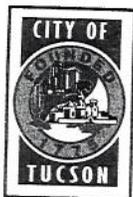
I would like to thank you in advance for your cooperation in this effort.

Very truly yours,

Andrew H. Quigley
Director

AHQ/FL/nr





CITY OF
TUCSON

ENVIRONMENTAL
SERVICES

November 4, 2013



Fairfax Companies Drexel Road Landfill
Jason Tankersly
11330 E. Drexel Road
Tucson, AZ 85715

Dear Mr. Tankersly:

The City of Tucson, Environmental Services Department (ES) is working with Cascadia Consulting Group to collect and analyze Tucson's waste disposal and diversion data. The information generated from the data analysis will assist ES in identifying future waste diversion opportunities for Tucson.

Representatives from Cascadia may be contacting you in the coming weeks to ask for your assistance. In particular, they will be seeking total annual tonnage and annual tonnage by sector (residential, multi-family, commercial) for waste collected, disposed, recycled, transferred out of Tucson, or otherwise diverted from Tucson-area landfills.

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I would like to thank you in advance for your cooperation in this effort.

Very truly yours,

Andrew H. Quigley
Director

AHQ/FL/nr





November 4, 2013

CITY OF
TUCSON

ENVIRONMENTAL
SERVICES

Fairfax Companies Ina Road Landfill
Jason Tankersly
5300 W. Ina Road
Tucson, AZ 85743

Dear Mr. Tankersly:

The City of Tucson, Environmental Services Department (ES) is working with Cascadia Consulting Group to collect and analyze Tucson's waste disposal and diversion data. The information generated from the data analysis will assist ES in identifying future waste diversion opportunities for Tucson.

Representatives from Cascadia may be contacting you in the coming weeks to ask for your assistance. In particular, they will be seeking total annual tonnage and annual tonnage by sector (residential, multi-family, commercial) for waste collected, disposed, recycled, transferred out of Tucson, or otherwise diverted from Tucson-area landfills.

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I would like to thank you in advance for your cooperation in this effort.

Very truly yours,

Andrew H. Quigley
Director

AHQ/FL/nr





November 4, 2013

CITY OF
TUCSON

ENVIRONMENTAL
SERVICES

Sierra Mining and Crushing
Shane Madsen
8665 S. Alvernon Way
Tucson, AZ 85706

Dear Mr. Madsen:

The City of Tucson, Environmental Services Department (ES) is working with Cascadia Consulting Group to collect and analyze Tucson's waste disposal and diversion data. The information generated from the data analysis will assist ES in identifying future waste diversion opportunities for Tucson.

Representatives from Cascadia may be contacting you in the coming weeks to ask for your assistance. In particular, they will be seeking total annual tonnage and annual tonnage by sector (residential, multi-family, commercial) for waste collected, disposed, recycled, transferred out of Tucson, or otherwise diverted from Tucson-area landfills.

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I would like to thank you in advance for your cooperation in this effort.

Very truly yours,

Andrew H. Quigley
Director

AHQ/FL/nr



**ATTACHMENT 2- PRIVATE HAULER/PROCESSOR SURVEY
QUESTIONS**

4. If you answered yes to collecting recyclables, do any of the facilities provide data on amounts and types of recyclables processed (e.g. tons of cardboard, mixed plastics, aluminum, etc.)? We understand this data is likely to be facility-wide rather than specific to Tucson-generated materials. If available, please email to KatieS@CascadiaConsulting.com or fax to (206) 343-9819.
5. Does *the hauler* collect C&D material from within Tucson City limits?
 - If yes, how much did *the hauler* collect last year?
 - Where was it disposed or recycled?
6. What, if any, recommendations do you have to increase waste diversion in Tucson?

1.2. Questions for Facilities

Please answer the following questions on quantities to the best of your abilities. If exact figures are not available, please provide your best estimate.

	2012 MSW (tons)	2012 Recycling (tons)
1. How much material did the facility receive from within Tucson City limits last year?		
2. About how much is from:		
Commercial haulers?		
Self-haul customers?		

3. If the facility does receive recycling from within Tucson city limits, can you provide any information as to the types and quantities of recycling (e.g., tons of office paper, cardboard, etc.)? We understand this data is likely to be facility-wide rather than specific to Tucson-generated materials. If yes, please email to KatieS@CascadiaConsulting.com or fax to (206) 343-9819.

1.

4. In addition to amounts listed above, does the facility receive any C&D waste generated within Tucson City limits?

	2012 C&D Waste (tons)	2012 C&D Recycling (tons)
5. How much C&D material did the facility receive from Tucson last year?		
6. About how much is from:		
Commercial haulers?		
Self-haul customers?		

7. What, if any, recommendations do you have to increase recycling in Tucson?

ATTACHMENT 3- WASTE QUANTITY AND COMPOSITION DATA COLLECTION PLAN

City of Tucson Waste Diversion Plan Task 2 Assess and Document Existing Conditions: Plan to Obtain Disposal and Recycling Data

Objective: Obtain data needed to calculate Tucson’s current waste disposal and diversion quantities and composition by sector. Obtained data will be used to populate the below table as well as to produce disposal and recycling composition profiles by sector, when possible.

Sector	Annual Disposal (tons)	Annual Recycling (tons)	Total (tons)	Recycling Rate (%)
Commercial				
Residential				
Self-haul				
Total				

Although the focus is on municipal solid waste (MSW), C&D data will also be collected when readily available during data collection efforts.

1. Contact ADEQ to request any disposal or recycling data they have for material generated in the City of Tucson.
2. Develop survey/questionnaires for requesting data from haulers and disposal sites.
3. Contact big five haulers to ask for quantity data by sector, where they take material, and for ideas on increasing diversion in Tucson using questionnaire developed in Step #2.
 - City of Tucson
 - Waste Management
 - Republic Services
 - Diggins Waste
 - Friedman’s Recycling
4. Survey disposal sites to obtain disposal quantity data by sector using questionnaire developed in Step #2.
 - City of Tucson’s Los Reales Landfill
 - Fairfax Companies’ facilities
 - Speedway Landfill
 - Ina Road Landfill
 - Drexel Road Landfill
 - Sierra Mining [a primarily green waste and rock/concrete disposal landfill])
 - Waste Management transfer station facilities
 - Ina Transfer
 - Rincon Recycle and Transfer
 -
5. Survey recycling facilities to obtain recycling quantity data by sector. *(Assuming the facility contacts will be different than hauler contacts for Waste Management and Friedman.)*

- Waste Management
 - ReCommunity
 - Friedman
6. Develop material flow chart for waste and recycling generated in Tucson showing how waste and recycling flows from haulers, including the city and the five major haulers, to disposal and recycling facilities.
 7. Consolidate disposal data to calculate total disposal.
 8. Consolidate recycling data to calculate total recycling.
 9. Compare disposal and recycling quantities with data from EPA, as well as the cities of Seattle, Portland, and San Francisco. Similar comparisons will also be made with the cities of Chandler and Phoenix, taking particular note of unique differences between Tucson's waste stream and those of Chandler and Phoenix.
 10. Apply composition data from comparable communities, by sector, to disposal quantities.

ATTACHMENT 4- DETAILED WASTE COMPOSITION TABLES

Table 1. Detailed Composition Results: Tucson Overall Waste Composition, 2012

Material	Estimated Percent	Estimated Tons	Material	Estimated Percent	Estimated Tons
Paper	25.1%	107,190	Organic	40.8%	174,510
Cardboard/Kraft	4.8%	20,473	Food	18.7%	79,866
Newspaper	2.7%	11,649	Yard Debris	12.1%	51,967
High Grade Paper	2.2%	9,403	Textiles	4.5%	19,316
Mixed Paper	7.0%	29,979	Other Organics	5.5%	23,361
Other Paper	8.3%	35,686			
			Construction and Demolition	12.5%	53,526
Plastic	9.1%	38,939	Asphalt Roofing	0.9%	4,057
PETE Containers	0.6%	2,464	Lumber	6.5%	28,014
HDPE Containers	0.6%	2,753	Gypsum Board	0.7%	2,870
Miscellaneous Plastic Containers	0.5%	2,073	Rock, Concrete, Ash, Soil & Fines	2.9%	12,216
Film Plastic	2.6%	11,199	Other Construction & Demolition	1.5%	6,369
Durable Plastic Items	1.6%	6,668			
Other Plastic	3.2%	13,781	Hazardous	0.6%	2,569
			Household Hazardous Waste	0.6%	2,569
Glass	2.3%	9,771	Other Materials	4.6%	19,858
Glass Bottle and Containers	1.9%	7,957	Bulky Items	1.8%	7,821
Other Glass	0.4%	1,815	Tires	0.2%	734
			Other MSW	2.6%	11,303
Metal	5.0%	21,400			
Aluminum Cans	0.2%	1,028			
Tin/Steel Cans	0.8%	3,379			
Other Non-Ferrous Metal	0.2%	784			
Other Ferrous Metal	1.6%	6,970			
Major Appliances	0.1%	595			
Other Metal	2.0%	8,646	Total	100.0%	427,764

Confidence intervals calculated at the 90% confidence level. Percentages for material types may not total 100% due to rounding.

Table 2. Detailed Composition Results: Tucson Residential Waste Composition, 2012

Material	Estimated Percent	Estimated Tons	Material	Estimated Percent	Estimated Tons
Paper	18.8%	28,249	Organic	54.8%	82,592
Cardboard/Kraft	3.2%	4,787	Food	17.6%	26,494
Newspaper	2.7%	4,122	Yard Debris	24.5%	36,851
High Grade Paper	1.1%	1,676	Textiles	5.5%	8,305
Mixed Paper	6.1%	9,177	Other Organics	7.3%	10,943
Other Paper	5.6%	8,487			
			Construction and Demolition	7.8%	11,777
Plastic	8.2%	12,316	Asphalt Roofing	0.2%	302
PETE Containers	0.7%	1,126	Lumber	3.0%	4,487
HDPE Containers	0.7%	1,070	Gypsum Board	0.1%	139
Miscellaneous Plastic Containers	0.3%	507	Rock, Concrete, Ash, Soil & Fines	2.7%	4,020
Film Plastic	0.9%	1,280	Other Construction & Demolition	1.9%	2,829
Durable Plastic Items	1.1%	1,659			
Other Plastic	4.4%	6,674	Hazardous	0.4%	577
			Household Hazardous Waste	0.4%	577
Glass	2.5%	3,837			
Glass Bottle and Containers	2.3%	3,472	Other Materials	2.9%	4,304
Other Glass	0.2%	364	Bulky Items	0.8%	1,268
			Tires	0.0%	20
Metal	4.6%	6,950	Other MSW	2.0%	3,015
Aluminum Cans	0.4%	639			
Tin/Steel Cans	1.0%	1,509			
Other Non-Ferrous Metal	0.2%	313			
Other Ferrous Metal	1.1%	1,625			
Major Appliances	0.3%	520			
Other Metal	1.6%	2,343	Total	100.0%	150,602

Confidence intervals calculated at the 90% confidence level. Percentages for material types may not total 100% due to rounding.

Table 3. Detailed Composition Results: Tucson Commercial Waste Composition, 2012

Material	Estimated Percent	Estimated Tons	Material	Estimated Percent	Estimated Tons
Paper	32.7%	76,538	Organic	36.8%	86,010
Cardboard/Kraft	6.3%	14,704	Food	22.6%	52,885
Newspaper	3.2%	7,412	Yard Debris	5.3%	12,358
High Grade Paper	3.3%	7,657	Textiles	3.8%	8,820
Mixed Paper	8.7%	20,226	Other Organics	5.1%	11,947
Other Paper	11.4%	26,539			
			Construction and Demolition	8.9%	20,714
Plastic	10.3%	24,102	Asphalt Roofing	0.1%	313
PETE Containers	0.6%	1,310	Lumber	5.8%	13,471
HDPE Containers	0.7%	1,659	Gypsum Board	0.5%	1,057
Miscellaneous Plastic Containers	0.7%	1,543	Rock, Concrete, Ash, Soil & Fines	1.3%	2,999
Film Plastic	4.2%	9,776	Other Construction & Demolition	1.2%	2,875
Durable Plastic Items	1.7%	3,882			
Other Plastic	2.5%	5,933	Hazardous	0.8%	1,818
			Household Hazardous Waste	0.8%	1,818
Glass	2.5%	5,735			
Glass Bottle and Containers	1.9%	4,425	Other Materials	2.9%	6,841
Other Glass	0.6%	1,310	Bulky Items	1.1%	2,546
			Tires	0.3%	703
Metal	5.2%	12,041	Other MSW	1.5%	3,592
Aluminum Cans	0.2%	380			
Tin/Steel Cans	0.8%	1,834			
Other Non-Ferrous Metal	0.2%	421			
Other Ferrous Metal	1.7%	3,987			
Major Appliances	0.0%	75			
Other Metal	2.3%	5,344	Total	100.0%	233,799

Confidence intervals calculated at the 90% confidence level. Percentages for material types may not total 100% due to rounding.

Table 4. Detailed Composition Results: Tucson Self-haul Waste Composition, 2012

Material	Estimated Percent	Estimated Tons	Material	Estimated Percent	Estimated Tons
Paper	5.5%	2,402	Organic	13.6%	5,908
Cardboard/Kraft	2.3%	982	Food	1.1%	488
Newspaper	0.3%	115	Yard Debris	6.4%	2,759
High Grade Paper	0.2%	70	Textiles	5.1%	2,191
Mixed Paper	1.3%	576	Other Organics	1.1%	471
Other Paper	1.5%	660			
			Construction and Demolition	48.5%	21,035
Plastic	5.8%	2,521	Asphalt Roofing	7.9%	3,442
PETE Containers	0.1%	28	Lumber	23.2%	10,056
HDPE Containers	0.1%	25	Gypsum Board	3.9%	1,674
Miscellaneous Plastic Containers	0.1%	23	Rock, Concrete, Ash, Soil & Fines	12.0%	5,198
Film Plastic	0.3%	143	Other Construction & Demolition	1.5%	665
Durable Plastic Items	2.6%	1,128			
Other Plastic	2.7%	1,174	Hazardous	0.4%	175
			Household Hazardous Waste	0.4%	175
Glass	0.5%	200	Other Materials	20.1%	8,713
Glass Bottle and Containers	0.1%	59	Bulky Items	9.2%	4,007
Other Glass	0.3%	140	Tires	0.0%	10
			Other MSW	10.8%	4,696
Metal	5.6%	2,409			
Aluminum Cans	0.0%	8			
Tin/Steel Cans	0.1%	36			
Other Non-Ferrous Metal	0.1%	49			
Other Ferrous Metal	3.1%	1,358			
Major Appliances	0.0%	0			
Other Metal	2.2%	959	Total	100.0%	43,363

Confidence intervals calculated at the 90% confidence level. Percentages for material types may not total 100% due to rounding.

ATTACHMENT 5- TUCSON AREA WASTE DIVERSION ACTIVITIES (TABLE)

Tucson Area Waste Diversion Activities

When evaluating Tucson’s diversion rate, it is important to note that numerous additional waste prevention, material reuse, and recycling activities are occurring throughout the community and not fully captured in the city’s current recycling rate estimate. However, these activities and organizations directly contribute to the city’s diversion of recyclable and reusable materials, and prevent additional material from entering the waste stream or landfills. The following is a sample of community-driven diversion activities actively operating in the Tucson area.

Organizations noted in this attachment represent a small portion of an enormous list of waste diversion actions taking place across the Tucson Area and in Eastern Pima County. Cascadia chose to highlight these particular organizations believing they represent the greatest, and most immediate, opportunities for partnership (or enhancement of existing partnership) to realize ambitions for near-term waste diversion.

Diversion Activity	Targeted Materials	Organization	Description	Online reference
Material Recycling/Processing	Windshield Glass	Absolute Recycling <i>a division of Absolute Auto Glass LLC</i>	Recycles 40,000 pounds of auto windshield glass per month. The cullet, (crushed glass) from windshields is sold for use in the construction industry, in roadways, waister filtering, sandblasting, countertops and more.	http://absoluteautoglass.info/More_uses_for_cullet.html
Material Recycling/Processing	E-waste	Suburban Miners	A major e-waste diversion company in Tucson that has diverted thousands of tons of electronics, metals, plastics and cardboard away from the local landfills, and created many more jobs for Tucson.	http://www.suburbanminers.com/donation.php
Education, Outreach, and Resources	n/a	Sustainable Tucson	Sustainable Tucson is a non-profit, grass-roots organization that builds regional resilience and sustainability through awareness raising, community engagement and public/private partnerships. Their members focus their action, advocacy and research through working groups addressing many local challenges, including waste reduction. Sustainable Tucson’s members work in the community to coordinate waste reduction and	http://www.sustainabletucson.org/affinity/food/

			recycling resources, study issues and make recommendations to local government, and provide professional and technical expertise to the community for development and implementation of practical waste diversion plans.	
Material Recycling/Processing	Green Waste	University of Arizona Compost Cats	Green waste is redirected to the College Agriculture Center where student employees and volunteers mix campus waste with horse manure and shape it into windrows. The resulting product is a rich and fertile soil amendment that can be added to campus and local landscapes and gardens.	http://studentaffairs.arizona.edu/greenfund/public_funding_rpt.php?fundID=50
Material Reuse	Household Items	Goodwill Industries	With 18 local stores that employ 500 people, Goodwill Tucson is a major player in the donation, re-use, and re-purpose stream for household goods, clothing, furniture, etc.	http://www.goodwilltucson.org/
Material Reuse	Household Items	Salvation Army	Accepts donation of household goods, clothing, furniture, and other items for re-use in humanitarian aid situations. Their efforts in Tucson, and elsewhere worldwide where they operate, serve as a major source of waste diversion from landfills	www.salvationarmy.org
Material Reuse	Household Items	SouthernArizonaNon-profits.org	Features an environmental section that features ideas and examples of ways to repurpose waste items into functional and artistic products	http://www.soaznonprofits.org/spring-greening-competition-recycles-items-into-functional-art/
Education, Outreach, and Resources	n/a	Recycle Arizona	Online recycling education and directory of local recyclers.	http://www.recyclearizona.net/
Material	Household Items	1-800-GOT-JUNK	A Tucson division of a nationwide company that	http://www.1800gotjunk.co

Recycling/Processing			collects residential and commercial on-site “junk”. The franchise tracks what they collect locally, with priority placed directing junk collected to recycling, reclamation, reuse, donation, and conversion to energy, before any of it goes to the landfill.	m/us en/locations/Arizona/junk-removal-tucson/
Material Reuse				
Education, Outreach, and Resources	n/a	FreeCycle.org	FreeCycle.org is a worldwide gifting movement (with strong name recognition and use in Tucson) that reduces waste, saves resources, and eases the burden on landfills while enabling its members to benefit from the strength of a larger community. FreeCycle is a resource connector for education, goods, and services related to recycling and waste diversion.	http://www.freecycle.org/
Material Recycling/Processing	Household and Commercial Items	FreeRecyclingQuotes.com	Operating in Tucson, this nationwide organization offers individuals, companies, governments, etc. quotes to collect large quantities of recyclable items, in particular, electronic waste, cell phones, paper, pallets, metals, organics, textiles and fibers, light bulbs, cardboard, chemicals, dumpsters, vehicles, and miscellaneous junk.	http://www.freerecyclingquotes.com/tucson-fibretextile-recycling.html
Material Reuse				
Education, Outreach, and Resources	n/a	Tucson Clean and Beautiful	Tucson Clean and Beautiful promotes and develops community environmental education and participatory programs in waste reduction, recycling, litter abatement and prevention, beautification, resource conservation, solar and alternative energy, and more. It is well-known for its website recycling directory with many dozens of links to locate local recyclers for materials, common and uncommon, from households, businesses, industry, hospitals, construction, etc.	www.tucsoncleanandbeautiful.org
Material Reuse	Household Items	World Care Tucson	World Care’s Tucson office manages the “Recycling Revolution” program as a way for organizations to	http://worldcare.org/recyclingrevolution/

			reduce their carbon footprint and support World Care’s humanitarian efforts by donating surplus goods for general recycling, or re-purposing as humanitarian aid.	
Education, Outreach, and Resources	Green Waste	Tucson Botanical Garden	Offering free or below-cost composters and composting tips	http://www.tucsonbotanical.org/gardening/earth-machine-composters-now-available/
Material Reuse	Wood and Plastic Pallets	Tucson Pallets	A specialty recycler focusing on the recycling of standard 48x40 pallets, including the rehabilitation of standard and combination (recycled and new wood) pallets, heat treating of pallets, and the rehabilitation and distribution of used plastic pallets, plus sawdust sales.	http://tucsonpallets.com/

**ATTACHMENT 6- TUCSON AREA GOVERNMENT-OPERATED WASTE
DIVERSION ACTIVITIES (TABLE)**

Tucson Area Government-Operated Waste Diversion Activities

When evaluating Tucson's diversion rate, it is important to note that numerous additional waste prevention, material reuse, and recycling activities are occurring throughout the community and not fully captured in the city's current recycling rate estimate. However, these activities and organizations directly contribute to the city's diversion of recyclable and reusable materials, and prevent additional material from entering the waste stream or landfills. The following is a sample of government-facilitated diversion activities active in the Tucson area.

Diversion Activity	Targeted Materials	Organization	Activity	Online reference
Education, Outreach, and Resources Material Recycling/Processing Material Reuse	Household Recyclables	City of Tucson Environmental Services Department	"Know Where to Throw" Periodically, the City of Tucson holds community drives to collect recyclable and reusable items that are often overlooked. For recent drive in 2012, a collection drive focused on four items - plastic bags, bicycle tires and tubes, blue jeans and garden hoses that were collected over a one-month period.	http://www.kvoa.com/news/city-kicks-off-know-where-to-throw-event/#
Education, Outreach, and Resources	n/a	City of Tucson Environmental Services Department	"Talking Trash in Tucson" Intended for grades 6-8, Talking Trash in Tucson (download) is a four-lesson recycling education curriculum designed for middle school students. The curriculum was developed to provide students with an understanding of how the City of Tucson manages solid waste and the importance and need for recycling in our community. The lessons focus on landfills, the concept of "Reduce, Reuse, Recycle," the City of Tucson's Blue Barrel recycling program, recyclable materials, and taking action. A variety of teaching and learning strategies are incorporated in these lessons, including discussion, small group work, research activities, and a poster contest.	http://cms3.tucsonaz.gov/es/content/school-outreach
Education, Outreach, and Resources	n/a	City of Tucson Environmental Services Department, Pima	"E Pluribus Re-THINKS-It!" Funded by the City of Tucson and Pima County, Tucson Clean & Beautiful offers "E Pluribus Re-	http://cms3.tucsonaz.gov/es/content/school-outreach

		County Department of Environmental Quality	THINKs-It!" an entertaining and educational play for children in kindergarten through third grade. Teachers may contact Tucson Clean & Beautiful schedule a performance at their school.	
Education, Outreach, and Resources	n/a	City of Tucson Environmental Services Department	<p>“Too Good To Throw Away”</p> <p>The City of Tucson provides upon request a variety of recycling education activity booklets targeted to specific language and student age groups:</p> <p>English Grades 1-2 Spanish Grades 1-2 English Grades 3-5 Spanish Grades 3-5</p>	http://cms3.tucsonaz.gov/es/content/school-outreach
Education, Outreach, and Resources	n/a	Arizona Department of Environmental Quality	ADEQ has, in years past, helped to document statewide waste, recycling, and diversion numbers through its annual report, last published in 2002. Though it has not been active in waste reduction since 2002, a new Recycling Coordinator position was recently staffed, and plans are in the works for reviving this useful report, funding grant programs for Arizona government agencies wanting to increase waste diversion, and more.	http://www.azdeq.gov/environment/waste/index.html
Education, Outreach, and Resources	Household Recyclables	Pima County Department of Environmental Quality	Pima County provides online resources for homeowners and businesses to learn about and implement methods for waste reduction, waste diversion, recycling, and more. Of particular use is the “County’s 101 Ways to Reduce Waste” page.	http://www.pima.gov/deq/waste/index.html
Education, Outreach, and Resources Material Recycling/Processing	Commercial and Household Items, Green Waste	University of Arizona Administration	Under the U of A Administration’s Climate Action Plan, the campus currently recycles 35 percent of all waste with the goal to increase 10 percent a year for the next 5 years. This includes 29 tons of students’ moving-out goods donated to nonprofits, composting 613,000 pounds of waste annually, and diverting 42	http://www.portal.environment.arizona.edu/sites/www.portal.environment.arizona.edu/files/portal/pdf/UA-CAP-SolidWaste.pdf

Material Reuse			tons of electronics from the landfill annually	
Education, Outreach, and Resources	School Recyclables	Tucson Unified School District	In addition to district-wide policies developed to achieve goals set for waste diversion, recycling, and waste reduction, TUSD also offers educational resources on the topic for its individual schools. As an example, the District's Engineering Department produces a solid waste worksheet to encourage teachers and students to study the existing solid waste conditions at their particular school, and then work internally, and with the District to make improvements.	http://www.tusd.k12.az.us/contents/depart/reap/Documents/solidwasteworksheet.pdf
Material Recycling/Processing				
Education, Outreach, and Resources	n/a	U.S. Environmental Protection Agency, Region 9	The Department provides region-wide and nationwide data relating to waste, waste reduction, recycling, and waster diversion. Via its website, online educational resources, news, and links to additional organizations are available to assist interested individuals, businesses, or government organizations to take a more proactive role in waste diversion.	http://www.epa.gov/region09/waste/solid/index.html
Material Recycling/Processing	Household Recyclables	City of Tucson Environmental Services Department – Recycling Collection	The city collects residential curbside recycling picked up the same day as weekly garbage collection. The department also provides neighborhood recycling centers for drop-off of any recyclables accepted in residential blue bins. Special waste reduction programs are also offered at certain times per year, including brush and bulky collection, and household hazardous waste drop-off.	http://cms3.tucsonaz.gov/es/customer-services-residential-recycling

ATTACHMENT 7- TUCSON RAW DATA

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	A	B	C	D	E	F	G	H	I	J	K	L
	Month/ Year	Total \$	Landfill Tons	City Residential	City Commercial	Saguaro	Arizona Hometown	Tucson Recycle	Other Commercial	Cash Commercial	Total Residential	
1												
2	Jul-10	\$ 466,203	35,886	13,172	6,906	4,980		72	5,105	1,718	2,855	
3	Aug-10	\$ 487,513	38,082	13,960	7,442	5,940	530	72	5,376	1,664	2,785	
4	Sep-10	\$ 537,715	37,112	13,447	6,936	5,409	525	79	5,846	1,883	2,726	
5	Oct-10	\$ 218,730	63,264	12,130	6,750	5,210	535	87	33,478	2,009	2,803	
6	Nov-10	\$ 1,340,235	52,936	12,078	6,692	5,184	421	73	23,541	2,029	2,309	
7	Dec-10	\$ 736,926	35,380	12,746	6,943	5,018	439	68	5,373	1,822	2,188	
8	Jan-11	\$ 437,483	33,869	11,764	6,624	5,660	373	83	3,882	1,970	2,144	
9	Feb-11	\$ 427,448	34,425	12,265	6,604	5,431	502	94	4,049	1,754	2,074	
10	Mar-11	\$ 502,643	41,823	14,620	7,294	5,756	512	77	5,656	2,661	3,127	
11	Apr-11	\$ 840,509	35,037	12,908	6,622	5,820	487	77	4,324	1,886	2,919	
12	May-11	\$ 533,520	37,046	12,447	6,831	6,060	435	92	5,625	1,560	2,680	
13	Jun-11	\$ 509,838	35,704	12,665	6,462	5,300	475	99	5,239	1,609	2,584	
14	Jul-11	\$ 573,394	37,625	12,588	6,342	5,459	578	117	5,146	2,051	2,975	
15	Aug-11	\$ 637,340	45,999	13,285	7,093	5,896	575	91	11,684	2,247	2,630	
16	Sep-11	\$ 658,095	38,442	12,862	6,688	5,791	591	87	6,499	1,848	2,473	
17	Oct-11	\$ 595,604	38,168	11,540	6,442	5,661	569	87	8,756	1,935	2,408	
18	Nov-11	\$ 641,788	37,232	12,334	6,421	5,587	539	92	22,705	1,905	2,095	
19	Dec-11	\$ 398,189	32,866	11,735	6,347	2,544	476	53	67,778	1,635	1,885	
20	Jan-12	\$ 596,753	38,323	11,768	7,733	4,507	518	59	8,186	1,964	2,376	
21	Feb-12	\$ 598,791	36,629	11,359	6,256	6,442	488	81	7,756	1,809	2,187	
22	Mar-12	\$ 590,213	37,968	11,996	6,528	6,108	569	62	7,550	2,070	2,618	
23	Apr-12	\$ 608,946	40,272	11,809	6,101	5,858	768	17	9,426	1,693	2,249	
24	May-12	\$ 638,268	39,013	12,547	6,787	5,197	589	7	8,440	1,963	2,603	
25	Jun-12	\$ 596,222	37,242	11,876	5,728	4,591	574	0	9,343	1,966	2,548	
26	Jul-12	\$ 653,674	43,369	12,985	6,365	7,826	538	0	10,005	1,741	2,571	
27	Aug-12	\$ 812,975	52,370	13,692	7,021	13,117	601	14	12,175	1,923	2,775	
28	Sep-12	\$ 660,535	39,939	11,360	5,091	11,115	567	0	7,134	1,170	2,631	
29	Oct-12	\$ 577,791	41,836	12,053	5,901	12,333	599	12	6,292	1,746	2,307	
30	Nov-12	\$ 575,283	39,693	12,029	5,331	11,619	591	0	5,439	1,704	1,967	
31	Dec-12	\$ 550,864	37,184	10,763	5,194	11,513	425	2	4,715	1,655	1,893	
32	Jan-13	\$ 562,241	41,809	12,220	5,472	12,480	572	1,275	7,285	1,740	1,749	
33	Feb-13	\$ 585,824	37,382	11,009	5,328	11,006	484	1,478	4,128	1,464	1,985	
34	Mar-13	\$ 595,216	40,232	11,981	5,402	11,414	571	1,206	7,617	1,841	2,756	
35	Apr-13		41,924	12,401	5,659	12,196	572	1,548	4,394	1,808	2,610	
36	May-13		42,932	11,924	5,794	13,008	627	1,425	4,585	1,833	2,597	
37	Jun-13		41,196	11,690	4,990	11,422	507	1,078	7,040	1,801	2,333	
38	Jul-13		45,739	13,300	6,080	13,541	627	1,170	5,363	3,113	2,624	
39	Aug-13		43,093	11,825	5,726	14,116	548	1,485	4,342	2,490	2,518	
40	Sep-13											
41	Oct-13											

TRash Chart Recycle Chart m-c charts LR Data Self-haulEst +

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LR Tonnage Est_130702_FY13_1-13-14.xlsx

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Los Reales Tonnages FY 2013													Updated 7/2/13	
	Cash Comm	Bill Comm	COT Depts	ES Res	ES Res BB	ES Com FL	ES Com RO	Self Haul (weighed loads)	SubTotal	Self Haul Loads	Self Haul Tons (0.36/ load)	Total	Self Haul Tons Sum	
3														
4	Jul-11	1,683	11,247	2,467	11,607	975	4,895	1,469	365	34,707	6,309	2,271	36,978	2,637
5	Aug-11	1,787	18,151	2,520	11,945	1,327	5,401	1,703	376	43,209	7,280	2,621	45,830	2,996
6	Sep-11	1,427	12,915	1,677	11,587	1,263	5,223	1,464	387	35,943	6,284	2,262	38,205	2,650
7	Oct-11	1,525	15,032	790	10,263	1,285	4,883	1,548	355	35,680	5,837	2,101	37,781	2,457
8	Nov-11	1,418	13,026	1,458	10,929	1,364	5,043	1,400	420	35,057	5,730	2,063	37,120	2,483
9	Dec-11	1,181	9,376	851	10,837	878	5,130	1,190	451	29,894	4,659	1,677	31,571	2,128
10	Jan-12	1,434	13,054	1,367	10,625	1,068	5,599	2,123	501	35,771	4,219	1,519	37,290	2,020
11	Feb-12	1,235	14,756	290	10,390	967	4,800	1,459	455	34,352	4,347	1,565	35,917	2,020
12	Mar-12	1,488	14,250	473	10,962	1,021	5,018	1,492	506	35,210	5,381	1,937	37,147	2,443
13	Apr-12	1,170	16,068	2,345	10,652	1,175	4,810	1,220	395	37,835	4,693	1,689	39,524	2,084
14	May-12	1,476	14,197	841	11,383	1,166	5,030	1,772	445	36,310	5,469	1,969	38,279	2,414
15	Jun-12	1,428	14,370	561	10,852	1,018	4,387	1,342	410	34,368	5,512	1,984	36,352	2,394
16		17,253	166,439	15,638	132,031	13,508	60,219	18,182	5,066	428,336	65,720	23,659	451,996	28,725
17					145,539			78,401					37,666	
18														
19	Jul-12	1,682	18,256	1,295	11,810	1,174	4,764	1,580	462	41,025	5,605	2,018	43,043	2,480
20	Aug-12	1,867	25,747	1,095	12,405	1,287	5,031	1,983	574	49,989	5,752	2,071	52,060	2,645
21	Sep-12	1,549	18,725	463	9,984	1,352	4,054	1,041	563	37,731	5,407	1,947	39,678	2,510
22	Oct-12	1,694	19,140	610	10,544	1,501	4,572	1,311	453	39,825	4,810	1,732	41,557	2,185
23	Nov-12	1,658	17,598	1,029	10,800	1,230	4,207	1,118	378	38,018	4,181	1,505	39,523	1,883
24	Dec-12	1,623	16,632	977	9,862	875	4,128	1,099	443	35,639	3,817	1,374	37,013	1,817
25	Jan-13	1,698	19,374	1,108	11,241	916	4,320	1,142	414	40,213	3,519	1,267	41,480	1,681
26	Feb-13	1,442	17,079	592	10,094	922	4,100	1,157	444	35,830	4,079	1,468	37,298	1,912
27	Mar-13	1,767	17,802	449	11,014	966	4,304	1,099	571	37,972	5,890	2,120	40,092	2,691
28	Apr-13	1,814	18,696	683	11,309	1,093	4,520	1,149	497	39,761	5,683	2,046	41,807	2,543
29	May-13	1,810	19,615	722	11,342	1,079	4,467	1,327	533	40,895	5,560	2,002	42,897	2,535
30	Jun-13	1,724	20,010	752	10,410	1,280	3,921	1,070	526	39,693	4,822	1,736	41,429	2,262
31	Total Curr FY	20,328	228,676	9,775	130,815	13,675	52,388	15,076	5,858	476,591	59,125	21,285	497,876	27,143
32	Avg Month	1,694	19,056	815	10,901	1,140	4,366	1,256	488	39,716	4,927	1,774	41,490	
33														
34	Forecast Mon	1,694	18,448	815	10,901	1,140	4,259	1,145	488	38,890	4,927	1,774	40,664	
35	Forecast Curr FY	20,328	228,676	9,775	130,815	13,675	52,388	15,076	5,858	476,591	59,125	21,285	497,876	27,143
36	Forecast 12 mos.	20,328	221,377	9,775	130,815	13,675	51,112	13,742	5,858	466,681	59,125	21,285	487,966	27,143
37					144,490			67,464						
38								211,954						

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	A	B	C	D	E
1	Date By Month	Site	Sum Of Weight		
2	Jul-12	City of Tucson-NRC	170.62		
3	Aug-12	City of Tucson-NRC	168.97		
4	Sep-12	City of Tucson-NRC	112.16		
5	Oct-12	City of Tucson-NRC	153.41		
6	Nov-12	City of Tucson-NRC	159.71		
7	Dec-12	City of Tucson-NRC	137.505		
8	Jan-13	City of Tucson-NRC	182.31		
9	Feb-13	City of Tucson-NRC	135.48		
10	Mar-13	City of Tucson-NRC	147.085		
11	Apr-13	City of Tucson-NRC	139.75		
12	May-13	City of Tucson-NRC	157.85		
13	Jun-13	City of Tucson-NRC	112.89272		
14	Jul-13	City of Tucson-NRC	129.36		
15	Aug-13	City of Tucson-NRC	134.53		
16	Sep-13	City of Tucson-NRC	144.31		
17	Oct-13	City of Tucson-NRC	119.97		
18	Nov-13	City of Tucson-NRC	152.74		
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	A	B	C	D	E
1	Time In By Month	Sum Of Ton	Avg Of Ton	Min Of Ton	Max Of Ton
2	March 2010	2,927.33	3.62	0.15	6.50
3	April 2010	2,981.20	3.51	0.25	6.48
4	May 2010	2,785.21	3.70	0.26	6.68
5	June 2010	3,125.83	3.55	0.23	7.11
6	July 2010	2,913.01	3.45	0.32	6.31
7	August 2010	2,862.00	3.61	0.51	6.73
8	September 2010	2,914.85	3.53	0.33	6.45
9	October 2010	2,884.03	3.64	0.15	7.05
10	November 2010	2,976.73	3.55	0.27	6.99
11	December 2010	3,301.69	3.65	0.14	6.39
12	January 2011	2,759.04	3.48	0.05	6.03
13	February 2011	2,648.69	3.40	0.45	7.02
14	March 2011	3,057.18	3.43	0.36	6.34
15	April 2011	2,777.27	3.43	0.01	5.98
16	May 2011	2,818.85	3.51	0.69	6.23
17	June 2011	2,987.45	3.38	0.07	6.43
18	July 2011	2,788.38	3.52	0.50	6.51
19	August 2011	3,029.39	3.45	0.49	6.30
20	September 2011	2,982.25	3.59	0.27	7.51
21	October 2011	2,782.30	3.49	0.30	6.34
22	November 2011	3,057.88	3.66	0.31	6.01
23	December 2011	3,097.63	3.68	0.29	6.33
24	January 2012	2,913.10	3.46	0.04	5.99
25	February 2012	2,706.78	3.36	0.08	5.94
26	March 2012	2,819.15	3.37	0.19	6.14
27	April 2012	2,695.35	3.41	0.49	5.59
28	May 2012	2,845.57	3.43	0.23	7.63
29	June 2012	2,547.60	3.23	0.37	5.98
30		34,265.38			
31					

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1	Time In By Month	Sum Of Ton	Count Of Commercial Data	
2	September 2010	359.31	91	
3	October 2010	377.24	88	
4	November 2010	365.38	93	
5	December 2010	347.29	91	
6	January 2011	365.55	96	
7	February 2011	347.01	86	
8	March 2011	412.09	99	
9	April 2011	362.51	89	
10	May 2011	393.11	94	
11	June 2011	344.89	94	
12	July 2011	312.42	83	
13	August 2011	377.7	89	
14	September 2011	340.51	83	
15	October 2011	316.61	80	
16	November 2011	320.63	81	
17	December 2011	307.34	75	
18	January 2012	295.48	81	
19	February 2012	298.39	76	
20	March 2012	311.79	84	
21	April 2012	281.03	79	
22	May 2012	350.63	87	
23	June 2012	246.32	68	
24		3758.85		
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Align General

C4

	A	B	C
1	Date By Month	Sum Of Sum Of Tons	Count Of NRCs_2011 Query
2	January 2011	196.98	13
3	February 2011	164.54	13
4	March 2011	183.01	13
5	April 2011	178.48	12
6	May 2011	186.56	12
7	June 2011	211.36	13
8	July 2011	182.75	13
9	August 2011	167.2	13
10	September 2011	169.81	13
11	October 2011	200.99	13
12	November 2011	187.32	13
13	December 2011	212.42	13
14	January 2012	244.41	13
15	February 2012	208.94	13
16	March 2012	189.59	13
17	April 2012	198.89	13
18	May 2012	164.91	13
19	June 2012	163.78	13
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Recycling tons FY-2013_12-23-13.xlsx

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	A	B	C	D	E	O	P	Q	R	S	T	U	V	W	X
	FY 2013 Recycling by Commodity														
Month	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Totals	Percent	
OCC and Other Paper	742	780	597	704	739.78	713	757	626	664	657	700	797	6,323	20.9%	
ONP and Other Paper	1,155	1,215	929	1,096	1151.29	1,109	1,178	974	1033	1022	1090	413	9,840	32.5%	
Aluminum	31	32	25	29	30.45	29	31	26	27	27	23	25	260	0.9%	
Tin	66	70	53	63	66.22	64	68	56	59	59	63	55	566	1.9%	
Other Metal	0	0	0	0	0	0	0	0	0	0	0	12	0	0.0%	
PET Bottles	127	133	102	120	126	122	129	107	113	112	120	124	1,079	3.6%	
HDPE Natural Bottles	33	35	27	32	33	32	34	28	30	30	31	43	284	0.9%	
HDPE Pigmented Bottles	38	40	30	36	38	36	38	32	34	33	36	36	321	1.1%	
Other Plastics	58	61	46	55	58	55	59	49	52	51	54	42	492	1.6%	
Clear Glass	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%	
Amber Glass	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%	
Green Glass	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%	
Other Mixed Glass	635	668	511	603	633	610	647	536	568	562	599	588	5,410	17.9%	
Trash	667	701	537	633	665	640	680	562	596	590	629	665	5,681	18.8%	
Total	3,552	3,735	2,858	3,371	3,540	3,410	3,621	2,995	3,175	3,143	3,345	2,799	30,256	100.0%	
Running Totals	3552	7286.53	10144	13515	17055	20465	24086	27081	30256	33399	36744	39544			

No U and TUSD COMM AQ Data Tots by Comm +

Normal View Ready Sum=0

ATTACHMENT 8- PRIORITIZED WASTE DIVERSION STRATEGIES

Prioritized Waste Diversion Strategies

The following presents prioritized waste diversion strategies developed for the City of Tucson and their relative impact in terms of diversion, cost effectiveness, and alignment with City goals. Complete details of strategies are reflective of materials identified by ESD as high priority, and are discussed in detail in this Appendix, including:

- Clothing/textiles (clothing and cloth scraps, household fabrics and linens, footwear, etc.)
- Food waste
- Electronic, or “e-waste” (computers, office electronic equipment, entertainment device [electronics](#), [mobile phones](#), [television sets](#), etc.)
- Construction and Demolition, or “C&D” (bricks, concrete, wood, [insulation](#), gypsum, etc.)
- Expanded polystyrene (protective packaging such as packing peanuts and CD and [DVD](#) cases, containers such as "clamshells", trays, etc.)
- Landscaping debris

These materials were selected because they:

- Are still being disposed in large volumes
- Have strong customer demand for associated recycling services
- Have viable waste diversion efforts that are currently self-sustaining, thereby not requiring any additional City funding or resources

Each strategy is introduced, and ranked low, moderate, or high with regard to alignment with City goals, waste diversion, and presence of key partners.

City Goals: This rating category is based on the City’s expressed preferences for the following three principles: 1) Use, or enhanced use, of existing waste diversion tools; 2) Encouragement of diversion that is self-directed and voluntary, rather than City-mandated or City-managed; and 3) Use of existing financial resources, or shifting of existing resources, versus adding to the Department’s budget.

Diversion: This rating category is based on capture rate data, diversion rate data, or, when data was unavailable, Cascadia’s 20+ years of experience with waste and recycling issues. Capture rates indicate how much of recyclable material is actually being recycled. For the data presented in this section, capture rates apply to *subsets* of materials (e.g. textiles, organics, and “bulky” items). Diversion rates, on the other hand, indicate how much *overall* material is diverted from disposal. The rankings of low, moderate, and high are associated with *capture* rates of <10%, 10-50%, and >50%, respectively. The rankings of low, moderate, and high are associated with *diversion* rates of <2%, 2-10%, and >10%, respectively.

Key Partners: This category is based on the existence of, or potential for, local partnerships. The ranking of “low” is associated with no available partners; “moderate” is associated with the availability of potential partners or available resources; and “high” is associated with either potential or existing partners.

PRIORITY MATERIAL #1 Clothing/Textile Reuse and Recycling

Strategy #1: Host community textile recycling events

Clothing drives as school fundraisers or at City events can build public awareness of textiles recycling.

Alignment with City goals: *High*. This strategy leverages existing resources and increases awareness of textile recycling.

Diversion: *Moderate*. Secondary Materials and Recycled Textiles (SMART) reported that their public awareness campaign partnership with Massachusetts DEP yielded a 10% increase in textiles tons captured in the first year.¹

Key partners: *Moderate*. SMART has information about local partners in their SMART Resource Guide.² Recycle Now is a useful resource for best practices on school fundraisers.³

Note: Fairmount, PA partners with a recycler that pays the City for any recyclable materials collected at community recycling events.⁴ Fairmount also offers on-site collection for a fee. The City collects textiles on specific days for citizens that make an appointment online at Fairmount CDC Recycling Events.⁵

Strategy #2: Develop a drop-off textile collection program

Most collectors primarily want material that can be resold or reused as-is, not lower-quality materials, which could contaminate the other portions of the load. For that reason, some industry representatives have suggested that having collection not connected to a retail organization might be necessary.

Alignment with City goals: *Moderate*. The City prefers to use existing resources rather than create new services, but this new service would not increase costs.

Diversion: *High*. Providing citizens with a known location for items (e.g., household hazardous waste) most often results in high rates of diversion for that item. This is especially true when a drop-off location can be permanently placed, and advertised as such.

¹ Cascadia Consulting Group. *SMART/LinkUp Introductory Meeting Notes*. 15 April 2013.

² The Education Center. *SMART Resource Guide*.

<http://www.theeducationcenter.com/Images/projects/2013/SO/1115-smartPDF-territory7.pdf>

³ Recycle Now Schools. *Bringing the curriculum to life*.

http://www.recyclenow.com/schools/recycle_at_school_guide/success_stories/bringing_the_curricu.htm

|

⁴ Community Recycling. *Welcome to Community Recycling*. <http://communityrecycling.biz/>

⁵ Fairmount CDC. *Community Textile Recycling*. <http://fairmountcdc.org/community-projects/green-clean/textile-recycling/>

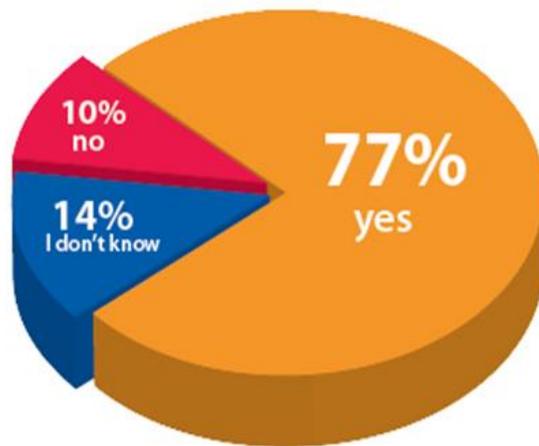
Key partners: *High.* Partners, such as USAgain, provide textile-recycling services at no cost to municipalities.⁶ In fact, revenues may be generated through textile recycling.⁷

Notes: Curbside pick-up may also be an option. St. Paul, Minnesota has a municipal hauling contract with USAgain.⁸ Also, over a 3-month pilot with 6,000 accounts, Queen Creek, AZ recently collected about 27,000 pounds of textile material through their curbside collection service.⁹

Figure 1. Municipal Support for Textile Recycling.

Should clothes & shoes collection be included in your city's recycling program?

An overwhelming 77% of respondents think municipalities should include textile recycling in local waste management programs.



Source: USAgain News That You Can Use Again Survey

⁶ USAgain. *Municipalities*. <http://www.usagain.com/municipality>

⁷ USAgain. *Green Your Community Profile*.

http://www.usagain.com/upload/1_USAgain_Community_Brochure_web.pdf

⁸ Saint Paul Minnesota. *Residential/Curbside*. <http://stpaul.gov/index.aspx?NID=5238>

⁹ Scrap. Ryan, Ellen. *Moving the Needle on Textile Recycling*. July/August 2013.

<http://www.scrap.org/ArticlesArchive/2013/July-August/Textiles.html>

Strategy #3: Join the Council for Textile Recycling (CTR)/Advertise

CTR provides messaging and marketing plans that leverage their national PSA about textile recycling: WEAR. DONATE. RECYCLE.

Alignment with City goals: *High*. This strategy leverages existing resources and provides free advertising resources to promote increased textile recycling.

Diversion: *Moderate*. SMART reported that their public awareness campaign partnership with Massachusetts DEP yielded a 10% increase in textiles tons captured in the first year.¹⁰

Key partners: *High*. The Council for Textile Recycling (<http://www.weardonaterecycle.org/>). The CTR website includes a web application to search for donation centers within a map view. CTR also has an illustrative Textile Recycling Infographic.¹¹

Notes: CTR membership is free for municipalities.

Strategy #4: Include textile recycling curriculum in schools

SMART has school curriculum available at The Education Center.¹² The downloadable content includes Common Core activities.

Alignment with City goals: *Low*. While Tucson has not identified partnering with education as an avenue for increased textile recycling, schools are an existing resource with independent funding.

Diversion: *Moderate*. SMART reported that their public awareness campaign partnership with Massachusetts DEP yielded a 10% increase in textiles tons captured in the first year.¹³

Key partners: *Low*. Local schools. There are many existing resources for curriculum, including Recycle Rosie,¹⁴ Recycle Now,¹⁵ and EPA curriculum.¹⁶

Note: Seattle, WA considers mandatory waste reduction and recycling in public school curricula in their Zero Waste plan.¹⁷

¹⁰ SMART/LinkUp Introductory Meeting Notes.

¹¹ Council for Textile Recycling. *The Facts about Textile Waste*.

<http://www.weardonaterecycle.org/about/issue.html>

¹² The Education Center. *Join the Recycling Rangers!*

<http://www.theeducationcenter.com/af/nl/tec/core/misc/learning/micrositePage.do?NAME=smart2013&topBanner=no>

¹³ SMART/LinkUp Introductory Meeting Notes.

¹⁴ Republic Services. *Recycle Rosie Curriculum: Understanding the Waste Cycle*.

<http://www.republicservices.com/documents/recycle-rose-education-curriculum.pdf>

¹⁵ Recycle Now Schools. *Activity Lesson Plans*.

http://www.recyclenow.com/schools/recycle_at_school_guide/activity_lesson_plans/

¹⁶ EPA. *Teachers: Curriculum and Activities*. http://www.epa.gov/osw/education/teach_curric.htm

PRIORITY MATERIAL #2 Organic Waste

Strategy #1: Operationally support existing efforts of Compost Cats

Alignment with City goals: *High.* This strategy leverages both existing resources, and existing partnerships.

Diversion: *High.* Between Feb. 2011 and Jan. 2013, Compost Cats composted 200 tons of food waste and 500,000 pounds of green waste. Composting animal bedding waste from university labs, for instance, will result in an additional 52 tons per year. Composting stadium and tailgating waste will result in an additional 25 tons.¹⁸

Key Partners: This strategy relies on the existing partnership, and further evolving the partnership, between ESD and the U of A Compost Cats.

Notes: Compost Cats expanded their operations in 2013 by partnering with San Xavier Co-op Farm. The goal of this expansion was to divert over 3,700 tons of annual food waste from the landfill in Rio Rico, AZ. San Xavier Co-op will receive compost in return for the program's use of their tractors, land, and water. Compost Cats submitted an application to the EPA in 2013 for approximately \$95,000 to finance this expansion.¹⁹

Strategy #2: Food waste prevention social media campaign.

Alignment with City goals: *High.* This strategy leverages existing resources.

Diversion: *Moderate.* London experienced a 15 percent decrease in the average amount of food waste generate per household after its social media campaign that included radio, digital, and print advertising along with supporting PR activities and events.²⁰

Key Partners: *Moderate.* While there are not existing or potential partners for this strategy, there are online resources that can be used for social media content, such as EPA's "Food Waste Reduction and Prevention" program²¹ and King County, Washington's "Food: Too Good to

¹⁷ City of Seattle. *Seattle Solid Waste Recycling, Waste Reduction, and Facilities Opportunities, Volume 2.* Prepared by URS Corporation, Herrera Environmental Consultants, Inc., and Norton-Arnold Company. April 2007.

http://www.seattle.gov/util/groups/public/@spu/@garbage/documents/webcontent/spu01_002547.pdf

¹⁸ University of Arizona Student Affairs and Enrollment Management. *Progress Reports.*

http://studentaffairs.arizona.edu/greenfund/public_funding_prgrpt.php?fundID=119

¹⁹ University of Arizona Student Affairs and Enrollment Management. *Harvesting the Waste of Nations: Emissions Reduction, Soil Fertility, Education.*

http://studentaffairs.arizona.edu/uploads/greenfund/prgrptOpt_1375998105_HarvestingtheWasteofNationsBorder2020Proposalfinal.pdf

²⁰ London Waste and Recycling Board and Recycle for London. *West London Food Waste Prevention Campaign Evaluation Report.* September 2013. Prepared by Wrap.

<http://www.wrap.org.uk/sites/files/wrap/West%20London%20Food%20Waste%20Campaign%20Evaluation%20Report.pdf>

²¹ EPA. *Food Waste Reduction and Prevention.* <http://www.epa.gov/foodrecovery/fd-reduce.htm>

Waste” program.²² Additionally, existing social marketing efforts, such as those by foodwastealliance.org, can be reposted.

Strategy #3: Backyard composting social media campaign.

Alignment with City goals: *High.* This strategy leverages existing resources.

Diversion: *Low.* While social media campaigns have been directly tied to a boost in waste diversion in many communities, such campaigns are targeted to specific audiences, and are limited in reach to those who choose to follow the City via social media channels. This strategy will grow greatly in its diversion potential, as ESD’s pool of social media followers also grows.

Key Partners: *Moderate.* Online resources, such as EPA’s “Backyard Composting” brochure²³ and Cornell’s “Small Scale and Backyard Composting” website,²⁴ provide useful information on backyard composting that can be used for social media content.

Notes: Applying social marketing techniques for residential organics diversion could include individual visits, neighborhood contests, door-to-door outreach, pledges, and colorful, targeted messages. Similarly, social marketing techniques for local businesses might involve the establishment of business recognition programs, focus group meetings, involvement of restaurant owners, hands-on training efforts, and more.

Social marketing messages are designed to provide consistent information on program expectations, goals, and guidelines; however, the message is targeted to specific audiences. Messages would address perceived barriers to participation and provide suggestions and solutions for overcoming concerns.

Strategy #4: Provide curbside pick-up of organic waste

Alignment with City goals: *Moderate.* This strategy requires the addition of new services, but consider Compost Cats as an existing resource that may be able process the collected materials.

Diversion: *Moderate.* In King County, curbside organics collection has resulted in a 13.1 percent capture rate of food scraps and compostable paper.²⁵

Key Partners: *Moderate.* ESD would rely on the strength of its own internal operations, but may also choose to engage the existing positive relationship with the University of Arizona’s Compost Cats.

²² King County. “Food: Too Good to Waste.” <http://your.kingcounty.gov/solidwaste/wasteprevention/too-good-to-waste.asp>

²³ EPA. *Backyard Composting*. <http://www.epa.gov/waste/consERVE/tools/greenscapes/pubs/compost-guide.pdf>

²⁴ Cornell Waste Management Institute. *Small Scale or Backyard Composting*. <http://cwmi.css.cornell.edu/smallscale.htm>

²⁵ King County. *King County Solid Waste Division: Organics Characterizations Report*. Prepared by Cascadia Consulting Group. June 2012. <http://your.kingcounty.gov/solidwaste/garbage-recycling/documents/Organics-Characterization-report-2012.pdf>

Notes: The City of Tempe, AZ has implemented green waste collection for residential bulk and brush service. The program costs between \$25 and \$40 per ton and has achieved a documented \$5.62 per ton reduction in costs to dispose of materials at the landfill.²⁶

Walla Walla, WA currently offers curbside pick-up offered March through November for a fee. See their website²⁷ and brochure.²⁸ Orange County, NC has a government-supported composting pilot at three schools where hauling services is provided.²⁹ There are no documented results to date.

The SSO Toolkit reports the experience of other municipal organic collection services and advice for starting a pilot program. Rates can be developed to completely offset the costs of curbside organics collection. According to the EPA-funded study, the collection has either been included in solid waste fees or range from \$3.50 and \$7.72 per month per participating household.³⁰ Additional information about capital costs and O&M expenses can be found on EPA's website.³¹

PRIORITY MATERIAL #3 Electronic Waste

ESD's priority to divert electronic waste is based, primarily, on its own account of customer inquiry and demand.

Strategy #1: Targeted Promotion of Tucson Clean and Beautiful

Alignment with City goals: *High.* This strategy leverages ESD's existing partnership with Tucson Clean and Beautiful (TC&B). Teaming with TC&B to strategically educate the community, and to promote diversion of a particular material stream (electronic waste, in this case) will boost the City's collateral effort to do the same.

Diversion: *Low.* While waste diversion and prevention education is a valuable part of any comprehensive waste diversion campaign, its reach, in this case is limited to the subset of the community that is aware of TC&B and its resources. A coordinated effort to further enhance TC&B's visibility among residents and businesses in Tucson would go a long way to boost the effectiveness of this strategy.

Key Partners: *High.* Tucson Clean and Beautiful is a current partner of the City.

²⁶ Maricopa Association of Governments. *Solid Waste Best Practices in the MAG Region*. December 2012. http://www.azmag.gov/Documents/SWAC_2013-01-18_Solid-Waste-Best-Practices-in-the-MAG-Region-Dec-2012.pdf

²⁷ Walla Walla WA. *Compost & Green Waste*. <http://www.wallawallawa.gov/depts/publicworks/solidwaste/compost>

²⁸ Walla Walla Valley Compost. *GroWW*. http://www.wallawallawa.gov/images/depts/publicworks/GroWW_062613.pdf

²⁹ *Best Practices for Local Government Solid Waste Recycling, Diversion from Landfill and Waste Reduction*.

³⁰ *Residential Source Separated Organics Collection Tool Kit*.

³¹ *Chapter Eight The Costs of Recycling and Composting, Waste Prevention, Recycling, and Composting Options: Lessons from 30 U.S. Communities*.

Notes: Some strategies for successful community engagement can be found on the Solid Waste & Recycling website.³²

Strategy #2: Collect self-haul e-waste

Alignment with City goals: *Moderate.* This strategy may function exclusively using ESD's existing self-haul capabilities at Los Reales, or may be expanded to include private sector waste partners like ReCommunity Recycling, Friedman's Recycling, Waste Management, and Republic Services. This strategy could be further expanded to include new and existing retail partners in the community.

Diversion: *Low.* Seattle expects a capture rate of 5 to 10 percent for the items included in their self-haul bulky item and e-waste collection programs, which includes electronic equipment such as TVs, computers and stereos, as well as appliances, furniture, yard items and mattresses.³³

Key Partners: *Moderate.* Potential partners include local retailers, ReCommunity Recycling³⁴ and EWaste Systems Inc.³⁵

Notes: Boulder, CO contracts with Eco-Cycle to operate a Center for Hard to Recycle Materials (CHaRM), which includes electronics. Residents may deposit items at the center for a \$3 per car fee.³⁶ Samsung is an official partner of the CHaRM, paying the recycling costs of Samsung consumer electronic products.³⁷

Philadelphia, PA accepts electronics at any of their three full service waste and recycling centers. The service is free by limited to personal vehicles. Pennsylvania also has one-day events throughout the year where residents can bring household hazardous waste included discarded electronics. The events are run by a contracted service provider.³⁸

The City of Toronto, Canada provides a green E-Waste bag to use for free, voluntary curbside pick-up.³⁹ Toronto's program diverted 75,702 tons of discarded electronics in 2012, or 5.61

³² Solid Waste & Recycling. *Community-Based Social Marketing*. Smith, John. 1 May 2005.
<http://www.solidwastemag.com/news/community-based-social-marketing/1000195050/>

³³ Seattle Solid Waste Recycling, Waste Reduction, and Facilities Opportunities.

³⁴ <http://www.recommunity.com/overview-purpose/>

³⁵ <http://www.ewastesystems.com/>

³⁶ *Best Practices for Local Government Solid Waste Recycling, Diversion from Landfill and Waste Reduction.*

³⁷ Eco-Cycle. *CHaRM: Center for Hard-to-Recycle Materials*. <http://ecocycle.org/charm>

³⁸ *Best Practices for Local Government Solid Waste Recycling, Diversion from Landfill and Waste Reduction*

³⁹ Toronto. *City collects electronics for recycling.*

<http://www1.toronto.ca/wps/portal/contentonly?vgnextoid=c89d433112b02410VgnVCM10000071d60f89RCRD>

kilograms (12.3 lbs) of electronics waste per capita. By 2012, the per ton cost to collect e-waste decreased by 30 per cent year-over-year.^{40 41}

PRIORITY MATERIAL #4 Construction and Demolition (C&D)

Strategy #1: Promote existing material reuse and recycling options

Alignment with City goals: *High.* This strategy leverages existing resources to promote existing opportunities.

Diversion: *Low.* It is extremely beneficial for an ever-increasing number of Tucson residents and businesses to be aware of the C&D material reuse and recycling options that currently exist. Cascadia's survey of Tucson-area diversion activities, however, suggests that the number of well-organized, and easily promotable C&D diversion options (that are also functionally able to participate on a citywide scale) is relatively small at this time.

Key partners: *Moderate.* This strategy would leverage known C&D reuse and recycling resources like Mikey Block and Sierra Mining and Crushing, among others, but would require the development of a notably larger network of such resources.

Notes: Oregon Metro offers practical tools to help contractors, architects and developers to keep building materials out of the landfill.⁴² They offer a Construction Salvage and Recycling Toolkit that offers more than 100 listings of recycling sites in the Portland metropolitan area.⁴³

Strategy #2: Provide reuse and recycling information through industry specific outlets.

Alignment with City goals: *Moderate.* This strategy may require additional resources, or diversion of an existing resource.

Diversion: *Moderate.* Individuals that actually make decisions on individual construction projects are most likely to encounter and digest such information when distributed directly through industry specific outlets (in this case, those outlets may include local chapters of construction industry associations, local and regional home-and-landscape design and construction-related publications, and via construction material suppliers in the area).

⁴⁰ Marketwire. *200,000 Tonnes Diverted: Ontario Surpasses Waste Electronics Reuse and Recycling Milestone.* 18 July 2013. <http://www.marketwired.com/press-release/200000-tonnes-diverted-ontario-surpasses-waste-electronics-reuse-recycling-milestone-1812524.htm>.

⁴¹ RecycleYourElectronics.ca. *E-Cycle Pledge.*
<http://ecyclepledge.recycleyourelectronics.ca/EcyclePledge.pdf>

⁴² Oregon Metro. *Construction salvage and recycling.*
<http://www.oregonmetro.gov/index.cfm/go/by.web/id/24684>

⁴³ Oregon Metro. *Construction Salvage and Recycling Toolkit 2012-13.*
http://library.oregonmetro.gov/files/2012_13_construction_salvage_recycling_toolkit.pdf

Key partners: *Low.* This strategy would likely require the development of a new, or enhanced, network of design and construction industry-specific partners.

Notes: This strategy would help C&D businesses recognize the need for recycling through targeted educational materials. Further promotion could include newspaper articles, media ads, information web pages, updated databases and direct mailings to businesses (e.g., Arizona Builders Association publications and website, plus ABA local industry conferences; *BIZ Tucson Magazine*; *Engineering News Record – Southwest Construction*; and Sustainable Tucson).

Strategy #3: Create strategic partnerships with local recyclers to support City-owned construction projects.

Alignment with City goals: *Moderate.* This strategy may require additional resources, and coordination with new and existing resources, as well as other City departments responsible for facilities, design, and construction.

Diversion: *Low.* C&D waste represents approximately 9% of Tucson’s commercial waste stream (see [Figure 5](#)). A percentage of that 9% of C&D waste is generated by construction and operations activity related to City-owned property. So, while all diversion counts toward the bottom line, the relative direct impact is small when compared to C&D generated in private-sector construction activity.

Key partners: *Moderate.* This strategy would leverage known C&D reuse and recycling resources like Mikey Block and Sierra Mining and Crushing, among others, but would require the development of a notably larger network of such resources.

Notes: This strategy would create relationships with local recyclers that collect construction and demolition materials and/or post-consumer materials to make products that could be used in City-owned construction.

For example, a project generating collaboration between Casella Resource Solutions and Foley Distributing, along with local schools, businesses, and other facilities has resulted in tightened supply chains and promotion of diversion rates within the community.⁴⁴ Collected resources, including recycled paper and cardboard, are turned into towel and tissue products. These products are then sold back to the same facilities that used the recycled materials to begin with.

In Tucson, a strategic partnership could be built with businesses like Mikey Block. The company recycles polystyrene to create insulated concrete forms that could be used in City-owned construction. This could also result in additional opportunity for post-consumer residential recycling.

⁴⁴ Casella Waste Systems. *Casella Waste Systems, Foley Distributing and SCA's Power of Three Program Receives the 2012 Vermont Governor's Award for Environmental Excellence.* Marketwire, 22 May 2012. <http://ir.casella.com/releasedetail.cfm?ReleaseID=675885>.

Strategy #4: Required recycling for City-owned construction or demolition projects.

Alignment with City goals: *Low.* Opposes ESD’s preference to avoid mandated and/or City-directed diversion solutions; however, if applied only to city-owned property, this strategy may fall more in the “moderate” category of alignment.

Diversion: *Unknown.* C&D waste represents approximately 9% of Tucson’s commercial waste stream (see [Figure 5](#)). A percentage of that 9% of C&D waste is generated by construction and operations activity related to City-owned property. While the quantity is unknown for this subset of divertible C&D materials, the City does have the direct ability, and legitimate reason, to influence this part of the overall waste stream over which it can exercise control.

Key partners: *High.* This strategy would rely primarily on ESD, itself, and coordination with other City of Tucson departments involved in construction contracting and permitting, as well as internal city facilities management, construction and operations functions.

Notes: Addressing waste reduction in a city-owned contract structure requires contractors to dispose of their own waste or use on-site recycling bins. The Construction and Demolition Waste Task Force has created WasteSpec, a tool to help with model language for waste reduction during construction.⁴⁵ Language included in city-owned contracts could address reuse of construction waste material on the construction site, salvage of construction and demolition material, return of unused construction materials to vendors for credit, and recycling of construction and demolition waste by delivering it to other sites for remanufacture into new products. The EPA has tools to help with C&D reduction, including a guide for setting up a jobsite recycling program.⁴⁶

The City of Tucson may decide to implement specific requirements for C&D city-owned projects reuse and recycling. For example, in a recycling incentive clause,⁴⁷ the contractor has a cost for traditional waste disposal but is encouraged to use waste and reduction recycling techniques. The contractor is paid in full for the awarded bid and retains profits from any cost reductions realized through recycling. Other examples could be required recycling percentage or required recycling of specific materials.

PRIORITY MATERIAL #5 Expanded Polystyrene Packaging

ESD’s priority to divert polystyrene packaging is based, primarily, on its own account of customer inquiry and demand.

⁴⁵ Triangle J Council of Governments. *Waste Spec. Model Specifications for Construction Waste Reduction, Reuse, and Recycling.* Prepared by Triangle J Council of Governments, Design Harmony Architects, and Abacot Architecture. July 1995.

<http://www.recyclecddebris.com/rCDd/Resources/Documents/CSNModelSpecWasteReduction.pdf>

⁴⁶ EPA. *Setting up a Jobsite Recycling Program.* <http://www.epa.gov/region09/waste/solid/pdf/cd3.pdf>

⁴⁷ Department of Defense. *Unified Facilities Criteria. Selection of Methods for the Reduction, Reuse, and Recycling of Demotion Waste.* Section 3-6.2. 1 December 2002.

http://www.wbdg.org/ccb/DOD/UFC/ufc_1_900_01.pdf

Strategy #1: Utilize existing social media and website marketing tools and partnerships

Alignment with City goals: *High.* This strategy leverages existing resources to promote existing opportunities and partnerships, and is aligned well with the city's goals for expanding its use of social media.

Diversion: *Low.* Online-based marketing will only reach residents who have an online presence, and who choose to follow ESD online. This is another example of a strategy that will grow greatly in its diversion potential, as ESD's pool of social media followers continues to grow.

Key partners: *High.* Leverage existing resources through targeted partnerships such as Tucson Clean and Beautiful, and through ESD's existing mechanisms to reach its waste customers (outdoor advertising, bill inserts, *Do More Blue*, etc.).

Notes: Maximizing social media and website marketing will help residents understand polystyrene recycling options and easily locate information.

For example, some residents may be unfamiliar with the term "expanded polystyrene" and may search social media and websites using different terms like "Styrofoam[®]" or "packing materials". Using alternate terms will ease confusion.

Additionally, linking social media postings to available database information will help residents locate local recycling information more easily.

Strategy #2: Build partnerships with local recyclers

Alignment with city goals: *High.* Leverage existing resources through targeted partnerships.

Diversion: *Low.* Strategic partnerships are an important first start to developing a network that can consistently function in a support role toward this effort.

Key partners: *Moderate.* This strategy would require the development of a notably larger network of businesses that reuse and/or recycle these materials (packing and shipping stores like FedEx/Kinko's and The UPS Store, for instance), but could begin with existing partners like Suburban Miners.

Notes: Building partnerships with businesses that accept non-food grade polystyrene could improve existing database information and improve resident access to recycling. An example of an opportunity for a strategic partnership would be Suburban Miners, a local recycling business in the Tucson area that accepts packing peanuts, sheets, box packaging, and bubble wrap.⁴⁸

⁴⁸ Suburban Miners. *Accepted Items*. <http://suburbanminers.com/accepted-items.php>

Strategy #3: Support alternative packaging options

Alignment with City goals: *Moderate*. This strategy could be interpreted to mean mandated diversion activities, which the city would prefer to avoid in lieu of voluntary participation; however, there are alternatives to regulation, such as the city's voluntary certification programs.

Diversion: *Low*. Voluntary participation in the use of alternative packaging, especially when promoted through programs with limited participation and reach (such as Tucson's Green Business Certification Program) will establish good working examples in the community, but will only go so far toward demonstrable diversion of these items.

Key partners: *High*. Leverage resources through the Office of Conservation and Sustainable Development.

Notes: As an alternative to legislation, recyclable and compostable packaging options can be included in the City of Tucson's Sustainability Actions Checklist as part of the Green Business Certification Program.