King County Waste Monitoring Program

Market Assessment for Recyclable Materials in King County

King County
Department of
Natural Resources and Parks
Solid Waste Division

Waste Prevention | Resource Recovery | Waste Disposal

www.kingcounty.gov/solidwaste

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FINAL

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Chapter 1. Introduction

1.1 MARKET ASSESSMENT OBJECTIVES

The King County Solid Waste Division commissioned Cascadia Consulting Group to conduct this study of markets for recoverable materials generated in the county. This assessment is intended to help the county and cities within the county identify opportunities, establish priorities, and guide programs for market development and increased diversion of recoverable materials from the waste stream. This study will support King County and the cities' waste reduction and recycling efforts and will be used to help guide the 2015 Comprehensive Solid Waste Management Plan Update.

This study is an update to similar studies completed in 1998, 2004, and 2006, all of which were also completed by Cascadia Consulting Group.[1] In contrast to prior study years, this study was intended to be more of a snapshot of local recycling markets and is based largely on interviews with regional processors.

1.2 MATERIAL GROUPINGS

The current study focused on three groups of materials, rather than on individual commodities. Following is a listing of the material groups considered for this study and the specific material types included in each, with the corresponding chapter number hyperlinked.

- **Commingled Curbside Recyclables** (Chapter 4) includes cardboard, mixed waste paper (including shredded paper), newspaper, PET (#1) plastic bottles, HDPE (#2) plastic bottles, other (#1 through #7) plastic containers, plastic film and bags, glass, and metals.
- **Organics** (Chapter 5) includes food, yard waste, compostable/soiled paper, and compostable service ware.
- **C&D Materials** (Chapter 6) includes concrete/asphalt paving/brick, gypsum scrap, wood, carpet, plastic film, and asphalt roofing shingles.

Each of the three chapters addresses the general processing and market conditions for the materials in each group (including information about supply and demand), discusses constraints and barriers to recovery, and recommends opportunities for public sector action.

In addition to the material specific chapters, the report begins with two overview chapters (in addition to the introductory chapter) that look across the three material groups to summarize findings and present supply data. These two chapters are:

- **Summary of Findings** (Chapter 2) provides an overview of the status of markets for individual materials within the three groups of materials in terms of supply, adequacy of processing capacity, and current markets.

[1] Reports from prior King County recycling market assessments can be found at http://your.kingcounty.gov/solidwaste/about/waste_documents.asp

- **Local Supply of Recyclable Material** (Chapter 3) presents recovered and disposed quantities and capture rates for the three groups of materials.

1.3 SUMMARY OF METHODOLOGY

Cascadia Consulting Group collected a range of data for each of the material groups. Our research included a literature review of industry-focused journals as well as a review of previous studies related to recycling markets. Cascadia also analyzed available supply data and King County projections of waste disposal to inform our findings. Finally, Cascadia conducted interviews with leading processors and other industry experts to obtain insights into current processing capacities; current and future market trends; and barriers to and opportunities for improving the recovery of materials in each group. Our principal findings are largely based on these interviews.

It should be noted that all tonnage data are for all of King County excluding Seattle, unless otherwise stated.

Chapter 2. Summary of Findings

To summarize the findings of the 2014 King County Recycling Market Study Cascadia ranked the health of markets for each material type in each of the three commodity groups included in this assessment. For each material type, we characterized the status of supply (supply available for recycling), processing capacity, current markets, and future markets, using the below ranking scheme:

KEY:

- Growing/emerging/strong upward trend
- Stable
- Weak/slowing/shrinking
- Disappearing/non-existent

2.1 Overview of Market Status for Commingled Curbside Recyclables

Interviewees reported that commingled markets are generally stable across all materials except for plastics, where current markets are expanding, and metals, where prices have declined throughout 2014.

Figure 2-1. Overview of Recycling Market Status: Commingled Curbside Recyclables

	Supply	Adequacy of Processing Capacity	Current Market
Paper	●	●	●
Plastic	●	●	↑
Glass	●	●	●
Metals	●	●	↓

2.2 Overview of Market Status for Organics

Organics supply and processing capacity is reported to be increasing, while processors report that current markets for organics products are stable.

Figure 2-2. Overview of Recycling Market Status: Organics

	Supply	Adequacy of Processing Capacity	Current Market
Food waste/ compostable paper	↑	↑	●
Yard waste	↑	↑	

2.3 Overview of Market Status for C&D Materials

C&D supply is generally increasing while the outlook for processing capacity is either stable or declining depending on material type. The status of current markets also vary by material type.

Figure 2-3. Overview of Recycling Market Status: C&D Materials

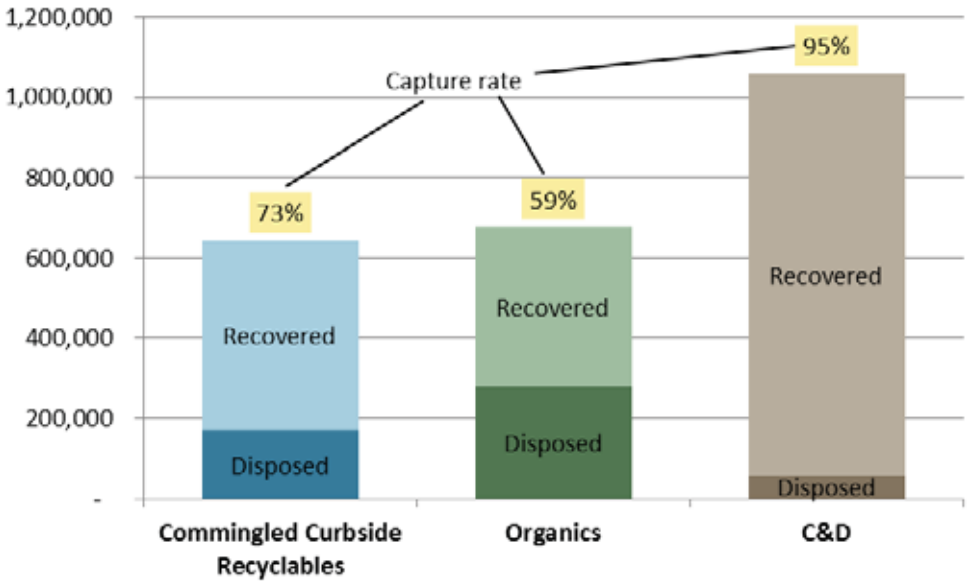
	Supply	Adequacy of Processing Capacity	Current Market
Wood	↑	●	↓
Gypsum	↑	●	↑
Carpet	↑	↓	✖
Plastics	↑	●	●
Asphalt shingles	↑	↓	↓
Aggregates	●	●	●

Chapter 3. Local Supply of Recyclable Material

As shown in Figure 3-1, this study addresses more than 2.3 million tons of commingled recyclables, organics, and C&D materials. Of those tons, over 1.9 million tons are estimated to be recovered, while more than 500,000 tons are estimated to be disposed. The capture rate for C&D (95%) is much higher than that of commingled recyclables (73%) and organics (59%), mainly because of the high diversion rate for concrete and asphalt paving. *Please note that these capture rates include only the material types examined in this study.*

These supply estimates are based on annual disposal and diversion tons, and waste composition data for King County excluding Seattle. Annual tons of MSW and C&D disposal were provided by King County Solid Waste Division. King County also provided recycling and diversion quantities by material type for 2012. King County MSW composition data from 2011 and King County C&D composition data from 2012 were applied to 2012 MSW and C&D tons disposed to estimate quantities of recoverable materials in the diversion streams.

Figure 3-1. Recycling and Disposal of Selected Materials Generated in King County[2]



[2] For this chart, the term "recycled" for C&D includes some end uses that may sometimes instead be considered "diversion" such as wood diverted for use as hog fuel.

Chapter 4. Commingled Curbside Recyclables

4.1 INTRODUCTION

Of the three material groups, commingled curbside recyclables has the longest diversion history, the most extensive recovery infrastructure, and, for some materials such as paper and metals, the highest value. The markets for these materials are a mix of export (paper and much of the plastic) and domestic (glass and metals). Markets for materials in this chapter are generally stable and anticipated to stay that way. Concerns for future markets are the continued closures of domestic paper mills and, for plastics, the low price of oil.

Since the 2006 study, two events had large impacts on local markets for commingled curbside recyclables. First, the recession of 2008 caused a sharp downturn in prices, particularly in the last quarter of that year. Since then, prices have been slowly returning to pre-2008 levels. Second, China's Green Fence, implemented in spring 2013, severely slowed exports for paper and plastics. Exports are moving again, though processors must meet higher quality standards than before the Green Fence was in place.

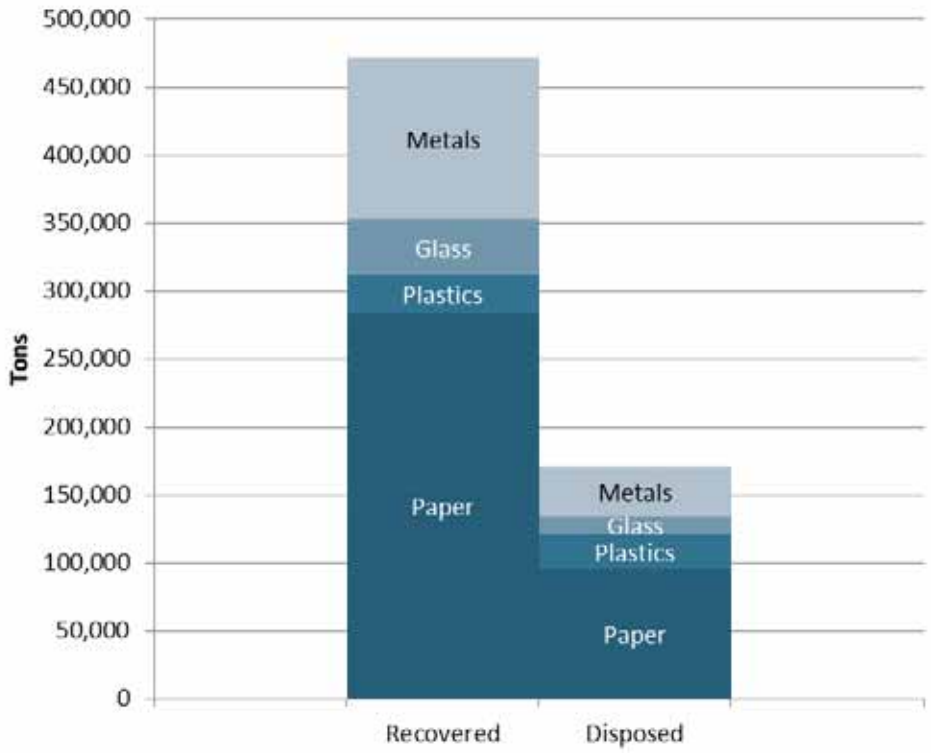
4.2 SUPPLY

Current Supply

The following figure summarizes our estimates of the commingled curbside recyclables generated in King County (excluding) in 2012. Annual tons of MSW disposal were provided by King County Solid Waste Division. King County also provided recycling and diversion quantities by material type for 2012. King County MSW composition data from 2011 were applied to 2012 MSW tons disposed to estimate quantities of recoverable materials in the diversion streams. *Please note that these estimates include only the material types examined in this study.*

As shown in Figure 4-1, paper made up the largest portion in both recovered and disposed commingled curbside recyclables. Metals was the second most prevalent material, by weight.

Figure 4-1. Estimated Tons Recovered and Disposed by Material Type, Commingled Curbside Recyclables



Projected Supply

The King County Solid Waste Division projects that approximately 252,000 tons will be disposed and 703,000 tons of commingled curbside recyclables will be recovered in 2030, assuming no major programmatic or policy changes. *Please note that these estimates include only the material types examined in this study.*

The following chart projects a status quo future where the recycling rate remains constant and recycling and disposal increase at the same rate.

Table 4-1. Projected Tons Recovered and Disposed, Commingled Curbside Recyclables[3]

	2012	2020	2030
Recovered	472,000	602,000	703,000
Disposed	170,000	216,000	252,000
Total Recoverable Materials	**642,000**	**818,000**	**955,000**

[3] Projections are based on estimates for annual disposal provided by King County Solid Waste Division. These estimates assume a static recycling rate.

Factors Affecting Future Supply Available for Recovery

- **Diversion will likely continue to increase due to public efforts and the changing waste stream.** The primary factors affecting future supply is increased diversion due to new recycling programs and regulations and the changing waste stream. Changes in the waste stream are largely driven by purchasing habits, such as people buying fewer newspapers, and changes in packaging, such as food purchased in pouches instead of cans.

4.3 PROCESSING

Overview of Processing System

Facilities processing commingled curbside recyclables generated within King County include:

- *Recology CleanScapes' new MRF (Seattle, WA).* Receives—or will soon receive—residential recycling from the cities of Burien, Carnation, Des Moines, Issaquah, Maple Valley, SeaTac, and Shoreline.
- *Republic's 3rd & Lander (Seattle, WA).* Receives residential recycling from Auburn (annexation areas only), Beaux Arts Village, Bellevue, Black Diamond, Clyde Hill, Covington, Hunts Point, Issaquah (South Cove), Kenmore, Kent, Lake Forest Park, Maple Valley (annexation area), Medina, Mercer Island, Normandy Park, North Bend, Ravensdale, Sammamish (S Area: N of Inglehill Rd), Seattle, Yarrow Point, unincorporated areas of northeast King County near Preston and Fall City, and unincorporated areas of southern King County near Renton, Auburn, and Kent.
- *Waste Management's Cascade Recycling Center (Woodinville, WA).* Receives residential recycling from Bothell, Duvall, Kirkland, Newcastle, Redmond, Renton, Snoqualmie, Tukwila, and Woodinville, and unincorporated areas east of Redmond.
- *Waste Management's JMK Fibers (Tacoma, WA).* Receives residential recycling from Auburn, Algona, Enumclaw, Federal Way, Pacific, and unincorporated areas in southeast King County.

Capacity Assessment (Current and Future)

- **The region currently has some excess processing capacity.** Most processors reported operating at only partial capacity: between 50 percent and 85 percent. One processor estimated that there is 20 percent capacity available overall in the regional commingled curbside recyclables processing system.
- **While the mix of facilities processing local recyclables has shifted in the past couple years, capacity remains about the same.** The closure of RockTenn's Renton MRF in October 2013 strained Recology CleanScapes, as they were sending recyclables they collected in King County to that facility. Following RockTenn's closure, Recology CleanScapes baled unsorted material for about six months until they opened a MRF in June 2014. The new MRF is currently operating at about one-third of its total capacity.

New and Emerging Processing Trends

- **The Green Fence has resulted in more stringent export quality standards for the foreseeable future.** China initiated enforcement related to Operation Green Fence in February 2013. This law, thought to be in effect since the 1990s, gives China the authority to reject shipments of recyclables that include food waste or other problematic contaminants. In response, processors have taken steps to improve product quality by increasing investment in sorting labor and equipment. For example, one company has added sorters and newspaper and cardboard screeners at all of their MRFs. Multiple processors noted that Chinese investment in enforcing the Green Fence may ebb and flow, but the quality standards that Operation Green Fence introduced are "the new normal."
- **MRFs in the region have been making major infrastructure investments to improve the quality of their outbound products.** Facilities are installing more sophisticated equipment in order to recognize and sort items from a more complicated incoming materials stream; comply with new contracts and Green Fence requirements; and respond to markets that are becoming more sensitive to contamination. For example, one company upgraded from a double deck to a triple deck OCC separation screen, replaced a 10-year-old news screen with a wider one that better disperses material, and added two eddy currents.
- **The region's new glass processor is working with local MRFs to improve the quality of their incoming glass feedstocks.** The glass processor Strategic Materials opened a facility in May 2014 on eCullet's former site, which is co-located with bottling plant Ardagh Group. As a result of Strategic Materials' partnership with local MRFs, one facility installed a vacuum system in spring 2014 to reduce contamination in their cullet. One glass recycling industry respondent expressed that dual stream recycling, or working with MRFs to remove glass earlier in their process, can significantly improve quality since commingled recycling "contaminates all the glass, and the glass contaminates everything else."

Processing Constraints and Barriers

- **Unbagged plastic film continues to be a processing nuisance.** Processors report that they need to halt operations every few hours to cut loose plastic film out of processing machinery like spinning discs in screens. One interviewee noted that there is a lot of labor involved in removing loose film before it reaches and gets tangled in the screens. Another processor stressed that film plastics are a nuisance, but not a contaminant as it is a marketable material when processors are able to effectively recover it in sufficient volumes.
- **Food contamination in incoming material causes material quality issues.** Most interviewees agreed that the biggest contamination challenge in commingled curbside recycling feedstocks is food waste. One processor noted that the food contamination their facility sees is not the food in a soup can, but more like material someone intended for the organics or garbage container that was mistakenly placed in the recycling bin. Processors reported that bags of trash, garden hoses, and textiles also contaminate recycling feedstocks. Multiple processors noted that educating the generator about correct recycling behavior is key to minimizing food waste contamination. One respondent mentioned that contamination has especially negative effects on residual rates, "Cities come to us and say that we're supposed to have 5% residual rate out of

the MRF, but we're at 7%. We get blamed, but they don't look at the contamination found in the incoming feedstock."

- **Ceramics, metals, stones, and paper are enduring contaminants in the glass stream.** Contaminants in the glass stream increase operating costs for manufacturers. One bottle manufacturer reported that their optical sorting equipment has difficulty recognizing and sorting out ceramics from the desired glass cullet. Metal sinks to the bottom of the furnaces and damages the equipment. Meanwhile, the carbon released by paper can affect product color. To address these issues, bottling companies add workers or tighten the equipment to catch more defects. Those adjustments increase costs and slow down production.

  Needles, vials, and other medical waste items have periodically been a problem as well, causing both contamination and worker safety issues. One glass processor reports that one local hospital was contaminating their glass loads with medical waste for a month this summer.

- **Processing loose shredded paper is challenging.** One processor reported that shredded paper is fine when in a clear bag, but when loose, it falls through the screens and ends up as residual. One company is installing equipment to better deal with shredded paper at their MRFs and explained that the current systems sort material by size so individual shreds of paper are difficult to sort. One interviewee noted that they preferred that residents be directed to place shredded in organics bins rather than recycling bins.

- **One processor reports that most MRFs in operation today were designed for the recycling stream of 10 or 20 years ago, while another believes new advancements have been made to adapt.** New improvements include new optical equipment and sizing adjustments to disc screens. Over the past two decades, product packaging has changed and the presence of more lightweight materials mean there is more volume to process in each ton.

- **Loose textiles can wreak havoc on MRF equipment.** Loose textiles can wrap around machinery and become difficult to remove. One processor complained that clothing is still an issue for their equipment, and another noted, "I can't think of a worse material to run through a single-stream system, other than chains, wire, and rope." Another processor did not note any processing concerns related to textiles and is working on partnerships with local thrift stores who could accept textiles collected curbside.

4.4 MARKETS

Overview of Markets

- **Markets have generally been recovering since the downturn in 2008.** Other than the "big dip" in the last quarter of 2008, markets have been fairly stable, albeit with seasonal fluctuations (generally processors see higher prices in spring and summer months). All respondents indicated that they could accommodate increased volumes of recyclable material from King County, and that end demand is sufficiently strong for most materials.

Current Markets

Paper

- **There are stable domestic and export markets for old corrugated containers.** Old corrugated containers (OCC) are typically turned back into packaging, medium cardboard, and liners. One processor reported that they are receiving more OCC than they have ever received before. Companies stated that well over half of their OCC is sent to export markets.
- **The markets for mixed waste paper are almost all export; they are moving slowly.** Processors reported that there are no more consuming mills in the Pacific Northwest, and the economics of sending mixed waste paper to the mills in the Midwest "don't make sense." Shanghai and Beijing are primary markets for mixed waste paper, including shredded paper. Office pack is exported to India, Vietnam, and Mexico. Processors report receiving smaller amounts of white paper than they have in the past.
- **The newspaper market is reported to be extremely slow due to regional news mill closures and changing feedstock.** Some processors are not sorting newspaper separately, because the price differential is not significant enough to cover sorting costs for the small volumes of newsprint they do receive. As a result, some newsprint mills are diversifying by converting machines so they can process cardboard and other "browns." Other mills are not able to compete and have had to shut down. Most of the markets for old newspaper are now located overseas.

  One processor explained that they have flexibility in how they process the various fiber materials streams. They have three screens at their facility – one for corrugated cardboard, one for old newspaper, and one for mixed waste paper. While one of the machines has the capability to sort out newspaper, the MRF is now baling news and mixed waste paper together. Their equipment gives them the option to start separating these materials, if the newspaper market recovers.

Plastics

- **The domestic and Canadian markets for polyethylene terephthalate (PET) are stable and growing, with volumes still being shipped to offshore markets**. One processor reported that their PET (#1) bottle market is primarily in the US and Canada, with a small portion—maybe 10%--going to China. Another, in contrast, said that most of their product is exported. The Southern California market is expected to grow; there is one processor in Northern California and there are a few in Southern California. PET is often converted to carpet or fleece.
- **High-density polyethylene (HDPE) market pricing fluctuate, and are mostly located in the US or Canada.** One company reported that they send all of their HDPE (#2) bottles to Frasier Plastics in Canada. Natural HDPE is typically worth at least 30% more than colored bottles, though that market is directly correlated to the price of oil and fluctuates frequently. One processor that sorts natural HDPE from colored HDPE and sells them in separate bales noted that there are some companies that forgo sorting by color and sell mixed HDPE bales at a lower price. Domestic plastics processors are expressing interest in locating facilities in the Western U.S. because of the availability of high-quality containers produced in Oregon and California, states with container recycling deposit legislation. HDPE plastics are often made into pipe or non-food containers.

- **Export markets for #3-#7 plastics are recovering, according to regional processors.** Markets for durable plastics were limited when the Green Fence was actively enforcing export quality standards, but they are now re-emerging. Processors reported that containers made with #3-#7 plastics are all exported to China. One processor estimated that this mix of plastics typically contains 80% polypropylene, which is quite valuable. One processor expects to continue to receive a wider variety of plastic commodities as jurisdictions and organizations try to find recycling outlets for more products. This interviewee was recently approached by a car seat recycling advocate; that material, though, is not a good candidate for MRFs to handle in that they contain both plastic and metal.
- **The overseas plastic film market was interrupted by the Green Fence, but is now recovering.** The grade is based on the color of the film: A is the highest quality, while D is dirty. Markets for low-grade MRF film plastic were interrupted for six to eight months following the launch of Green Fence. This market has since recovered. One company has found an emerging market—making car parts in the Southeast U.S.—but otherwise the film market continues to be primarily located in China. Until a few months ago, all film product was going overseas; today, about half is going to international markets while the other half is staying domestic.

Glass

- **There is a consistent local bottling glass end market with stable prices**. Cullet pricing is considered to be very stable, because it is driven by the price of virgin raw materials, which is also stable. Pricing, though, is somewhat affected by the level of contamination, with lower prices for more contaminated cullet.
- **Glass from the three Puget Sound-area MRFs is going to the bottle-to-bottle market.** All three local MRFs reported sending glass to Strategic Materials, though one company says the glass processor vacillates on whether they can accept all of this company's Puget Sound-area glass. These fluctuations may be due to space constraints at Strategic Materials; when they reach capacity onsite, they cannot accept any more material. In addition, the timing of Strategic Materials start-up coincided with the highest glass generation season.

Metal

- **The metal market dipped in 2008 and continues to fluctuate.** Interviewees agree that the current market for metals is rather weak. Reportedly, prices reached $200 per ton within the last five years, but are currently at only about $120 per ton. One processor stated that prices have been climbing since the dip in 2008 until 2014, when: "prices [have been] sliding downward almost every month this year." The market for steel, in particular, has declined significantly, whereas the aluminum market has stayed more stable.

  Respondents report that metal markets are primarily located in the U.S. They either sell through brokers, or directly to mills, such as Anheuser Busch or Alcoa. Sometimes processors will even direct materials to local recyclers like Simon Joseph and Sons or Pacific Iron and Metals.

New and Emerging Markets

- **New and emerging markets are limited, likely because of consistently strong export demand for most curbside recyclables.** Consistency in export demand can reduce the drive for market innovation. Commercializing a new technology is also a

major challenge. “Cities think any technology or any market they read about on the internet can be plugged into any waste stream. It’s not that easy,” asserted one interviewee. Reconfiguring plants to accommodate new materials, new processes, and new technologies represents a major investment, and one that is difficult to make all at once.

Market Constraints and Barriers

- **Markets tend to fluctuate with the seasons, holidays, elections, labor strikes, and other domestic and overseas events.** Overseas markets tend to slow down at the end of the year. Multiple processors noted that port slowdowns related to labor issues, which happen almost annually, adversely impact markets for all materials. This year, in particular, the West Coast port slowdown is creating challenges with moving containers of recyclables to overseas markets. One processor noted: “The port issues are worse than the Green Fence.” Some local processors are reacting by leasing space to store materials, and in at least one case, sending material to another MRF for processing. The longer the slowdown goes on, the more challenges the local MRFs will have, especially given increased recycling quantities generated during the holiday season.
- **Processors would prefer to have more domestic market options for primary recyclable materials, including paper and plastics.** Processors noted that they prefer domestic markets because they can have more market control. They would like to reduce their vulnerability to sudden or unexpected foreign policy changes; the Green Fence “taught everyone they could lose a market in a minute.”

  Within the domestic markets, companies would like to see more diversity, and more capacity to work with mixed waste paper and plastics. “Think about how crazy it is,” said one respondent. “We can send paper on a boat to China, and get more money than if we had put it on a truck to Longview.” Still, processors appear doubtful that the balance between export and domestic markets for their primary materials will change anytime soon.
- **Glass markets are largely dependent on one glass beneficiation plant**. MRFs would like to have more buyer diversity. Strategic Materials is the only secondary glass processor in the region. They sell the majority of the glass they process to Ardagh Group and send a small amount to Bennu Glass, located in southwest Washington. Interviewees do not expect to see major changes in glass markets in the near future.
- **Over the past several years, the local glass market has been in flux as players have changed and processing capacity has varied; that said, the outlook is positive**. This region is fortunate to have local infrastructure for both processing and bottle manufacturing, which creates an efficient, closed loop system. Strategic Materials is the third plant to be the primary supplier of cullet to the Ardagh Group’s Seattle bottling plant in the past seven years. The new Strategic Materials facility opened in May 2014; this plant is meeting Ardagh’s needs for material quality and both parties are reportedly satisfied with their partnership.
- **Glass bottles from China are competing with U.S.-produced products for the same end markets.** Domestic glass container manufacturers report that they are concerned about maintaining their competitive edge in the face of increasing glass imports from China and other countries. Competition with other imports, like plastic packaging, continues, but is not a new phenomenon.

4.5 POTENTIAL PUBLIC SECTOR ACTIONS

Respondents identified two public sector opportunities to increase recycling of commingled curbside recyclables.

- **Consider bolstering the County's investment in public education.** "The most important thing that can be done to keep recycling sustainable is to educate kids," asserted one respondent. "We need to educate people—through open houses, speeches, big recycling events—on what can go in bins. Make it fun." Another company agreed, urging King County to drive an awareness effort. They noted that if commercial customers are going to be increasingly targeted to reduce contamination in the recycling stream they generate, they should receive the same kind of education that historically has been directed at residential customers.
- **When looking to expand the list of acceptable materials, consider first consulting with processors to ensure that materials can be effectively recovered and have viable markets.** One respondent urged that local jurisdictions not expand the acceptable materials list much further, even given the available processing capacity. Doing so can complicate processing and contaminate other recyclables and even with increased processing abilities, many of these marginal materials do not have strong existing markets. More work can still be done just to collect core materials (bottles, cans, and paper).

Chapter 5. Organics

5.1 INTRODUCTION

Since the 2006 study, there are more organics processors receiving organics from King County. Lenz and PacifiClean are now accepting, or will very soon accept, organics generated in King County. More organic material is being recovered than in 2006; the recycling rate has doubled from almost 30% to almost 60%. This is likely due to increased availability and awareness of organics recycling options. From 2006 to the current study, the percent of single-family households with access to curbside organics collection options for food waste has gone from 47% to 99%.[4]

However, the market for the finished products in Western Washington may be saturated. In response to this market saturation, processors are looking to grow the agricultural market for compost in Central and Eastern Washington. Contamination has likely increased with expanded food waste collection, and is a significant challenge in current and new markets, as it was in 2006.

5.2 SUPPLY

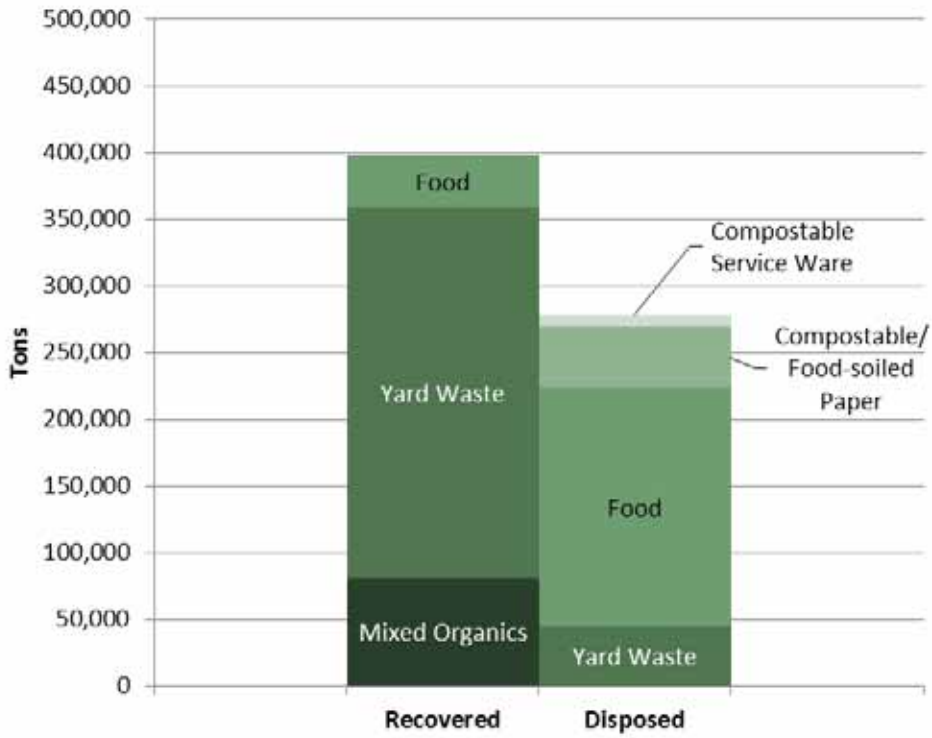
Current Supply

The following figure summarizes our estimates of the organics generated in King County (excluding Seattle) in 2012. Annual tons of MSW disposal were provided by King County Solid Waste Division. King County also provided recycling and diversion quantities by material type for 2012. King County MSW composition data from 2011 were applied to 2012 MSW tons disposed to estimate quantities of recoverable materials in the diversion streams. *Please note that these estimates include only the material types examined in this study.*

As shown in Figure 5-1, yard waste made up the largest portion of recovered organics while the largest portion in disposed organics is food waste.

[4] King County Curbside Food Scrap Collection homepage: http://your.kingcounty.gov/solidwaste/garbage-recycling/food-collection.asp

Figure 5-1. Estimated Tons Recovered and Disposed by Material Type, Organics



Projected Supply

The King County Solid Waste Division projects that approximately 412,000 tons will be disposed and 594,000 tons of organics will be recovered in 2030, assuming no major programmatic or policy changes. *Please note that these estimates include only the material types examined in this study.*

The following chart projects a status quo future where the recycling rate remains constant and recycling and disposal increase at the same rate.

Table 5-1. Projected Tons Recovered and Disposed, Organics[5]

	2012	2020	2030
Recovered	398,000	509,000	594,000
Disposed	278,000	353,000	412,000
Total Recoverable Materials	**676,000**	**862,000**	**1,006,000**

[5] Projections are based on estimates for annual disposal provided by King County Solid Waste Division. These estimates assume a static recycling rate.

Factors Affecting Future Supply Available for Recovery

- **Feedstock supply is expected to increase with the new Seattle ordinance that bans the disposal of food scraps and compostable paper.** Seattle Ordinance #124582, effective January 1, 2015, mandates organics recovery by prohibiting the disposal of food waste and compostable paper from residential, commercial, and self-haul generators in the City of Seattle.
- **Contaminants in feedstocks are also anticipated to increase with Ordinance #124582, specifically with the introduction of more food scraps.** Processing facilities will likely need to adjust their operations to accommodate the new feedstocks and continue to produce high quality products. One composter commented that a growing focus on zero waste may also result in higher contamination, as customers err on the side of putting more items into the organics bin than in the trash bin.
- **King County and member cities' increased diversion goals in 2015 may impact supply of organics.** As the King County Solid Waste Division and its member cities embark on drafting an updated Comprehensive Plan with high diversion goals, organics management will be a priority. Actions taken by the County and its municipalities could have an impact on the supply of material requiring processing.

5.3 PROCESSING

Overview of Processing System

- **Currently, most of the organics generated within King County are processed by Cedar Grove Composting facilities.** Reportedly, only a small amount of organics are going to Lenz Enterprises. In the near future, all of Seattle's residential organics will either be processed by the new PacifiClean facility in Quincy, WA or by Lenz in Stanwood, WA.

Capacity Assessment (Current and Future)

- **There is more than adequate regional processing capacity to handle a growing amount of organics generated within King County, both now and in the future.** When PacifiClean's new facility comes online, anticipated in early 2015, Seattle organics will be diverted from Cedar Grove Composting to PacifiClean, opening up even more processing capacity at Cedar Grove's Maple Valley facility. Cedar Grove's Everett composting location also has additional capacity. During peak yard waste season, when its processing capacity is fully utilized, Cedar Grove Composting can contract out additional processing to other facilities in the region. PacifiClean is currently planning to use only about half of its 60-acre site, and could double its processing capacity by utilizing additional land at its site. In total, the permitted capacity for the four facilities interviewed is approximately 850,000 tons per year, of which about 60% is currently in use. After the opening of PacifiClean, the western Washington facilities interviewed will likely be operating at approximately 60-70% of permitted capacity with about 150,000 to 200,000 tons capacity per year available.

New and Emerging Processing Trends

- **Processors are recognizing and acting on the need for more robust processing systems to accommodate higher levels of contamination.** Processors report using

advanced systems to identify contamination (like glass and film plastic) and process a variety of compostable materials. Interviewees noted that color-based product identification, slow speed shredders, longer sort lines, and wider sort lines are effective at removing contaminants.

- **Anaerobic digestion (AD) systems are part of an integrated organics management solution, but not "the silver bullet."** Some composters are eager to add—or are already investing in—anaerobic digestion systems to provide complementary processing capacity for food waste. At the same time, anaerobic digesters have their limitations; for example, they can only process certain feedstocks, such as clean food. As one composter noted, "exotic new technologies tend to be very specific on what they can process, and the economics don't always pencil out." New AD capacity may also create competition for clean food feedstocks, pitting traditional composting operations against new AD systems.
- **Processors expressed interest in incorporating woody debris from Construction and Demolition (C&D) feedstocks into soil amendment applications.** C&D processors interviewed for this work report that paper mill closures have limited the primary market for wood. One interviewee noted that this debris could be incorporated into composting operations for processing into a soil amendment. This processor states that they have enough capacity to receive and process C&D wood debris on a daily basis.

Processing Constraints and Barriers

- **Regional processing facilities will need to invest heavily in on-site systems and equipment that can effectively manage changing feedstocks.** All interviewees noted that changing feedstocks include more contamination than most processors have historically handled, and are likely to force investments in additional sorting equipment and labor. One interviewee noted that much of the existing infrastructure was designed to process yard trimmings, not an organics mix that also includes food scraps, compostable paper, packaging, and contaminants. As one company said, "feedstock has changed, processing technology has not," leading to a "huge decrease in product quality." One interviewee now has a longer sort line to accommodate more contaminated loads. One processor reported that their facility was specifically designed to handle complex feedstocks, with enhanced mechanical equipment (for example, magnetic components and air lifts), more manual sorting capacity, and longer composting retention times to produce more marketable products.

  Processors report that though market prices and sales for compost products have been stable, they are not sufficient to cover the increased cost of processing materials. One composter said their revenues from product sales have increased 5-10% over the past five years, which was insufficient to cover the added cost of removing more contaminants during processing.

  Composters shared that though they are trying to anticipate future feedstocks, they need more information on anticipated volumes and the makeup of incoming materials in order to better inform investments in processing capacity, equipment, and labor.
- **Customers have changed purchasing habits in response to concerns regarding contamination.** Market demand for cleaner products is also driving enhanced processing systems. For example, the Washington State Department of Transportation (WSDOT) previously purchased a coarse product for use as roadside cover, but they noticed significant amounts of visible contamination in that product, especially when the

product was blown in. Therefore, WSDOT is now exclusively purchasing a finer product. The Department of Ecology is also increasing market demand for cleaner products, by limiting the amount of allowable inerts in finished products to one percent and film plastic to only 1/10 of a percent. According to Washington State University, local farmers have also expressed concern about the amount of plastics they have found in some loads of compost, although the concerns have decreased since WSU has started using a double-screened compost blend as opposed to a single-screened product.

- **Plastics and glass still present processing challenges.** All processors agreed that plastic contaminants are difficult to remove from feedstocks and increase the cost of processing. One company noted the complexity of dealing with a mix of compostable and non-compostable plastics, both for consumers and for processors. They noted that "[plastics] have to go one way or the other—all compostable, or not." Another respondent disagreed, saying that they have "no problem processing approved compostable plastics." One processor noted that film plastics, including black garbage bags and grocery bags, continue to interrupt processing systems. Another processor noted that they are still receiving small amounts of glass in incoming feedstocks, which presents its own processing challenge.
- **There are significant barriers to siting new organics processing facilities in King County.** According to one large compost operator, it would be extremely difficult, if not impossible, to site a new organics facility in King County due to permitting requirements and community concerns.

5.4 MARKETS

Overview of Markets

- Compost markets remain volatile and seasonal, and WSDOT projects are a shrinking market opportunity in the near term; however, market opportunities in other parts of the state and product diversification provide promising alternatives.

Current Markets

- **Almost all organic feedstocks generated within King County are being converted into compost products, which are primarily used as soil amendments.** All interviewees stated that nearly all of their finished products go to compost soil amendment markets. One processor reported that about 35-60 percent of their product is used by a combination of government agencies and landscapers. This same processor reported that residential demand varies greatly, depending on disposable income and whether or not households are working on home or yard projects. The processor also noted that, depending on whether residents are doing the work themselves or hiring a landscaper, residential demand can make up between 15-50% of the market. This processor reported less than 5% of their product going to agricultural applications.

Another processor notes that residential applications are about 40% of their market, government agencies make up approximately 30%, landscapers are roughly 20%, and agricultural applications (primarily urban agriculture like community gardens and pea patches) make up about 10%.

- **The balance between supply and demand depends on the market boundaries.** Organics markets are regionally specific, with notable differences between Western and

Central Washington. Some companies reported robust markets in Western Washington, while others are already seeing signs of saturation in that market. Several composters that reported a stable supply and demand balance still expressed concern about having enough demand to match the anticipated increased supply with new food waste, particularly once Seattle Ordinance #124582 is in effect. Processors noted that there is a very large agricultural market demand in Central Washington. It will likely be necessary to tap into these markets in Central in Eastern Washington in order to fully utilize future supplies of compost soil amendments.

- **WSDOT demand for compost is declining, primarily due to a lack of funding for roads projects.** In recent years, WSDOT was a major buyer of compost from several companies across Washington State; however, the large road projects funded through gas taxes and bonds in the last 15 years are nearing completion. Accordingly, the WSDOT expects to use much less compost—down to about 20,000 cubic yards per year from about 50,000 to 100,000 cubic yards annually since 2004—unless funding is allocated for new major projects. Most upcoming WSDOT project work will likely focus on landscape maintenance, which uses little compost. The same interviewee reported that WSDOT has shifted their purchases from medium to fine compost as the level of contamination is too high in the larger blends. When they need a coarse product, WSDOT is now more likely to purchase a wood product instead of compost.

New and Emerging Markets

- **Agricultural applications, particularly those in Central Washington, are expected to be a significant near- and longer-term market opportunity.** Composters were enthusiastic about the market potential in industrial agriculture, which can reportedly use as many as 20 dry tons per acre, depending on the crop and existing soil quality. They called the "millions of agricultural acres" east of the Cascades an "almost endless opportunity." Washington State University is also encouraging compost use at farms through research and demonstration trials in Snohomish County and King County.[6] A challenge for this market, though, is that compost is more expensive to purchase and apply than other soil amendments, such as manure.
- **WSDOT contractors are potential new purchasers of compost.** Responsibility for temporary erosion and sediment control measures (TESC) is now falling on private contractors, rather than WSDOT. Contractors will now hold the permits for TESC projects and can make decisions about the products that they use for these projects, making them a new potential marketing target for compost producers.
- **Product diversification is expected to increase marketing opportunities for compost products.** "No one wants one customer for all of their products," emphasized one interviewee. Some processors rely heavily on a single buyer, but diversification is a common goal. Two facilities are already set up to make tailored products for each large customer and for a variety of markets.

Market Constraints and Barriers

- **Significant barriers exist to entry into the agricultural soil amendment market.** Processors report that compost is more expensive than the manure that farmers have traditionally used as a soil amendment. Furthermore, the threshold for product

[6] Compost Outreach Program homepage: http://ext100.wsu.edu/snohomish/compost/

contamination in the agricultural market is extremely low. "If they see a single bottle in a trailer full of material, that's enough to cause concern," said one respondent. "Two million pounds of potatoes could [ultimately] be rejected by a buyer." The costs are significant to ship, process, and market quality compost products to agricultural centers in Central and Eastern Washington. Washington State University, with funding provided by King County, is working on a cost-benefit analysis of the use of compost in agricultural applications, which is expected to be completed by the end of 2016.

- **Market demand for compost products is volatile and highly seasonal.** Processors note that seasonality and construction project timelines are the "two biggest variables" affecting market demand. Slowdowns in construction reportedly have a major impact on composters, and demand can change very quickly. One company asserted that processors may need to reduce their product prices to move material out of inventory.

5.5 POTENTIAL PUBLIC SECTOR ACTIONS

Respondents identified several public sector opportunities to bolster organics recycling. Specific recommendations from interviewees include providing property and streamlined permitting for new AD facilities, educating customers in order to reduce contamination, and fostering new end markets to receive the increased supply of finished compost products. More details about these and other recommendations are provided below.

- **Consider increasing customer education efforts to reduce contamination in feedstocks.** Some processors think that the public sector should assume responsibility for managing contamination through education and enforcement efforts, and others feel it should be addressed through enhanced processing. The solution is likely a combination of those efforts. Processors suggested educational measures, such as producing flyers and television ads to educate the public and highlight the problems caused by contamination ("Do you want this [contamination] in your garden?"), and having inspectors identify the worst offenders. Processors also recommended requiring that compostable and non-compostable packaging be made in different colors, to facilitate sorting at processing facilities.
- **Explore how to assist Western Washington composters in reaching agricultural markets in Central and Eastern Washington.** One composter recommended that the public sector absorb the costs of delivering product to agricultural markets in Central and Eastern Washington. Farmers are interested, but the cost of delivery can be prohibitive for both farmers and processors.
- **Continue to support research of agricultural uses of compost.** King County could continue to partner with WSU to help local farms experience first-hand how compost may be useful to them. WSU's compost outreach project provides participating farms with a compost donation so that they can compare the use of compost to their normal operations.
- **Investigate opportunities to support and promote the growth of the municipal market.** One way to support the growth of regional markets is to guarantee a market for compost products. More specifically, processors suggested that municipalities purchase surplus compost at a reduced rate (floor price) for public infrastructure projects. This type of arrangement could incent municipalities to use—and promote the use of—compost products in public projects (for example, parks, parking strips, and median landscaping).

- **Consider encouraging the development of anaerobic digestion capacity as part of an integrated organics management system.** King County is conducting a feasibility study in early 2015 to assess the viability of locating AD facilities at select transfer stations. One interviewee suggested that King County could further support AD facilities by providing property and streamlining the permit process (similar to the City of San Jose's partnership with ZWED). Another interviewee suggested that the County could help identify sources of food and other digestible organics feedstocks that would not interrupt existing composting facility feedstocks. Other opportunities may include further study of AD opportunities and limitations, and working with permitting agencies to address any regulatory barriers.
- **Encourage the use of compost for post-construction soils by working with other local jurisdictions to harmonize requirements; consider increasing enforcement of current requirements.** Amending soil with compost after construction is one way for permit holders to meet the requirements of their permits in King County and Seattle.[7] King County could work with local jurisdictions to encourage implementation of and standardization of similar measures. Additionally, King County could ensure that this requirement is being enforced.

[7] King County's Post Construction Soils Standard brochure: http://your.kingcounty.gov/DDES/forms/ls-inf-SoilPost-ConStd.pdf
Seattle's Stormwater Code website: http://www.seattle.gov/dPd/codesrules/codes/stormwater/default.htm

Chapter 6. Construction & Demolition (C&D) Materials

6.1 INTRODUCTION

C&D recycling can be a difficult business with substantial processing costs; in addition, most markets are geographically constrained due to transportation costs. Since the 2006 study, local C&D recycling faced a major setback for wood markets with the closure of the Kimberly Clark mill in Everett in April 2012.[8] Two mixed C&D processing facilities changed owners or closed: CDL Recycle, LLC changed hands from CleanScapes (now Recology CleanScapes) to Drywall Recycling Services Inc.; and Waste Management bought Glacier Recycling, the largest processor of C&D waste in King County, in 2010. The Glacier Recycling facility closed its doors in fall 2013.

Looking ahead, supply is expected to increase for most recyclable C&D materials as King County and Seattle are implementing new regulations. Both are embarking on a new C&D recycling system including material disposal bans and restricting delivery of C&D materials to certified disposal and processing facilities.

6.2 SUPPLY

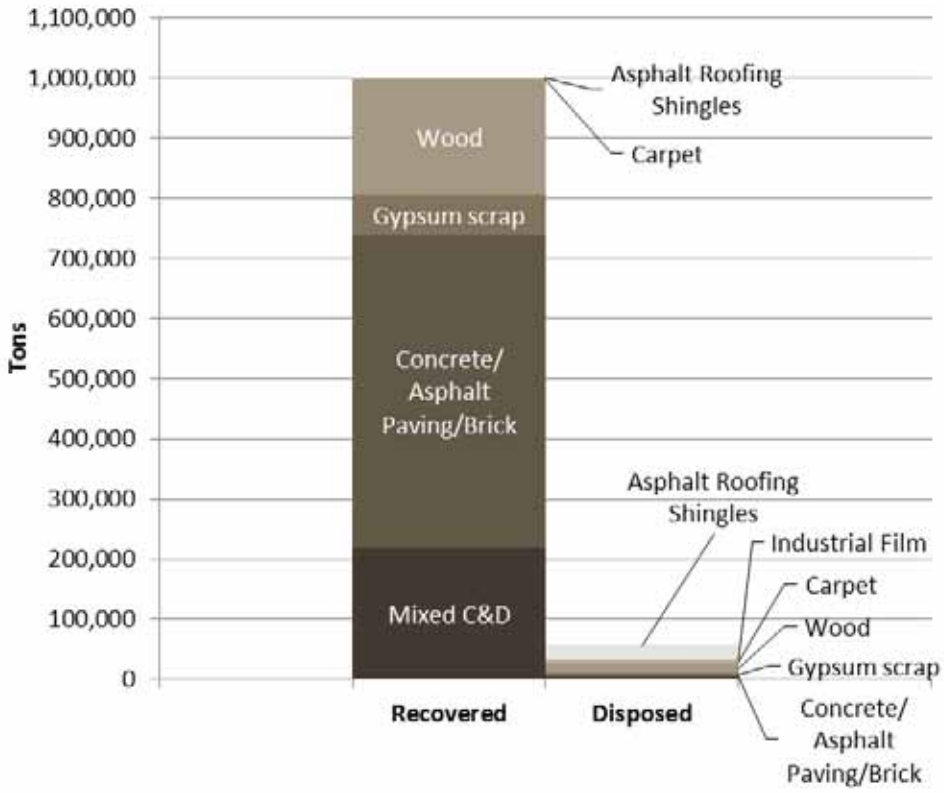
Current Supply

The following figure summarizes our estimates of the C&D generated in King County (excluding Seattle) in 2012. Annual tons of C&D disposal were provided by King County Solid Waste Division. King County also provided recycling and diversion quantities by material type for 2012. King County C&D composition data from 2012 were applied to 2012 C&D tons disposed to estimate quantities of recoverable materials in the diversion streams. *Please note that these estimates include only the material types examined in this study.*

As shown in Figure **6-1**, concrete/asphalt paving/brick, mixed C&D, and wood were the most prevalent materials in recovered C&D while the most prevalent materials in disposed C&D are asphalt roofing shingles and wood.

[8] "Potential buyers eye Kimberly-Clark's former mill site in Everett," Nancy Bartley. The Seattle Times. May 12, 2012. http://seattletimes.com/html/localnews/2018198357_mill13m.html

Figure 6-1. Estimated Tons Recovered and Disposed by Material Type, C&D



Projected Supply

The King County Solid Waste Division projects that approximately 93,000 tons will be disposed and 1,641,000 tons of C&D will be recovered in 2030, assuming no major programmatic or policy changes. *Please note that these estimates include only the material types examined in this study.*

The following chart projects a status quo future where the recycling rate remains constant and recycling and disposal increase at the same rate.

Table 6-1. Projected Tons Recovered and Disposed, C&D[9]

	2012	2020	2030
Recovered	1,001,000	1,407,000	1,641,000
Disposed	57,000	80,000	93,000
Total Recoverable Materials	**1,058,000**	**1,487,000**	**1,734,000**

[9] Projections were estimated assuming the C&D disposal would increase at the same rate as MSW and that C&D would maintain a static diversion rate.

Factors Affecting Future Supply Available for Recovery

- **Bans may result in higher levels of source separation and divert more materials to processing.**
- **Processors also anticipate that supply will increase as material from demolition projects is processed rather than disposed in intermodal containers.** The intermodal containers that are currently landfilled frequently have more than 10% banned C&D materials in them, and will need to be processed instead of disposed.
- **Processors stated that they expect the improving economy to produce new and more feedstocks from construction, remodeling, deconstruction, and tenant improvement projects.**

6.3 PROCESSING

Overview of Processing System

The primary facilities processing C&D materials from King County include:[10]

- CDL Recycle
- Recovery 1, Inc.
- Republic's Black River Transfer and Processing Facility
- Republic's Third & Lander Transfer Station
- Waste Management's Eastmont Transfer Station

Numerous other facilities also report that they receive at least some C&D material from King County for recovery. These include:

- United Recycling & Container
- Cadman
- CWRR
- Drywall Recycling Services
- Lakeside Industries
- Lenz Enterprises
- New West Gypsum

C&D materials from King County are also flowing to other facilities, primarily outside of King County, for processing.

Capacity Assessment (Current and Future)

- **Several processors have reported that they have excess capacity or that they have room to expand.** One reason for the excess capacity is to limited markets for C&D materials. For example, wood makes up the majority of the C&D materials generated in King County, and demand for wood is currently low. Since there are limited markets, the C&D processors are handling less material, which creates additional capacity under current market conditions.
- **New West Gypsum has relocated a gypsum recycling facility from Pierce County to King County.** This facility is currently operating at 25% capacity. Their current primary feedstock is new gypsum scrap from drywall installers. In the future, they will

[10] Third & Lander and Eastmont transfer material from highly recoverable C&D loads to other facilities for processing.

probably reach out to local processors and act as a secondary market for the gypsum that these processors recover. New West Gypsum's processing system recovers 100% of the gypsum in new gypsum scrap, and recovers the paper liner on gypsum scrap for baling and recycling. The facility can also handle demolition and painted gypsum.

- **Carpet recycling infrastructure in the Northwest is shrinking.** One of the three local processors for carpet, Carpet Collectors, recently stopped operating in the Northwest and the remaining two processors, one of which is only operating on a pilot basis, are not accepting new clients.
- **C&D processing capacity decreased significantly with the closure of Waste Management's Glacier Recycling (Auburn).** Glacier Recycling, the largest processor of C&D waste in King County was bought by Waste Management in 2010 and closed its doors in fall 2013.[11] The decision to close the facility was due to market conditions, according to Waste Management, though the facility also faced regulatory challenges from Seattle and King County Public Health Departments.

New and Emerging Processing Trends

- **A new proprietary processing method for carpet doubles the fiber yield and recovers all components of the carpet.** The proposed technology recovers both the carpet fiber and the backing for recycling. The traditional carpet processing technique includes shearing the carpet fiber off its backing, and disposing of the backing with fiber still attached (called "the carcass"). The proposed processor reports that the new technique gets twice the yield of traditional carpet shearing techniques. In contrast to current carpet processing, which recovers 20% of the fiber, this new method would recover 40% of the fiber.

  This new approach is also expected to include co-locating a pelletizing operation with the carpet processing. The pellets, which can be sold in the global commodities markets, will be used to manufacture a wide variety of products. This will greatly expand the market for recovered carpet fiber. To date, carpet recycling options have primarily been limited to remanufacturing carpet fiber into new carpet.

Processing Constraints and Barriers

- **Processors report that regulatory and flow control constraints inhibit investment in new processing facilities in King County.** Interviewed processors mentioned at least 3 facilities that have shut their doors in the last 2-3 years due to a combination of regulatory challenges, the economics of operating in King County, and a downturn in the economy around 2008.
- **Current contracted facilities receive a large portion of non-recoverable loads, resulting in low facility recovery rates.** Per their contract with the county, these facilities must accept all loads that arrive, even non-recoverable loads. These processors noted that accepting non-recoverable loads drives their overall recovery rates down, making it difficult to compete for projects aiming for high diversion (for example, LEED certified projects). Facilities that are non-contracted can turn away non-recoverable loads, have a higher facility recovery rate as a result, and therefore are

[11] "WM scraps construction recycling operation," King5.com. September 19, 2013. http://www.king5.com/story/tech/science/environment/2014/08/04/13314790/

more likely to receive clean, source-separated loads from projects with aggressive diversion rates.

- **Bans could potentially result in loads being rejected by both processing and disposal facilities.** If a load contains some banned C&D materials and a lot of non-recoverable material, non-contracted processors report that they will likely reject it; however, they also noted that disposal facilities could not dispose of these loads if they contained more than the permitted amount of banned materials. The question they raised was "where will the dirty loads go now?"
- **As the economy improves, it will be harder to keep sorters at current labor prices.** Multiple processors reported that they were struggling to find and keep workers as the labor market tightens. The skillset in the entry-level labor class is flexible and therefore in high demand. There are lots of jobs that would compete for that same, flexible labor pool. For example, with the slowdown at the port, there were lots of laborers looking for work; the one local MRF hired some of them as sorters.

6.4 MARKETS

Overview of Markets

- Interviewees reported that the most problematic current market is for wood; however, there are potential new market opportunities for wood on the horizon, as well as for carpet. Plastics markets are currently weak, metals markets are stable, and aggregates markets are stable at low or no price.

Current Markets

- **Wood markets are currently stable but limited to hog fuel and compost, and prices are low.** Current supplies are reported to exceed demand, largely due to mill closures. One interviewee reported that prices for wood in hog fuel applications recently dropped to approximately $25 per bone-dry ton, down from $45 per ton. Another interviewee stated that they have to pay to get rid of wood due to swelling supply.
- **There are multiple strong markets for gypsum, offering diverse opportunities.** Several processors reported that their markets "can't get enough [gypsum]" and that they can "move every ton [they] get [their] hands on." New West Gypsum supported this consensus, saying "manufacturers are asking for more material." Several processors noted that prices are stable and predicted that as the economy improves, new construction, tenant improvement, and deconstruction projects will increase the local supply of gypsum. End-use markets are reported to be primarily for re-manufacture into new drywall. Some processors also noted other potential markets for gypsum, including soil amendments, mushroom substrate, and cement.
- **Carpet markets are weak to non-existent.** One processor reported that they currently dispose of carpet because they cannot find a viable market. Another processor noted that there are "no markets for carpet." An Oregon carpet recycler who sends carpet to overseas markets reported that the Green Fence dramatically affected export markets, though they are moving again now. That same collector reported that traditional Georgia markets are extremely limited while plants are re-tooling but anticipates that demand will return. There are only three pelletizers reported to be capable of processing carpet fiber into nylon pellets, all in the Midwest or on the east coast. Demand is low for carpet components other than nylon face fiber. In addition, manufacturers are increasingly

using PET face fiber which is a challenge for recyclers because it cannot be recycled and must be discarded.

- **The markets for construction plastics, including film, vinyl, and other rigids, are still weak, but processors reported that markets for film and vinyl are improving.** One interviewee stated that markets for plastic film were low for a couple of years, and many processors had a backlog of film that they were storing, but that those inventories have been depleted. Film plastics are reportedly sold into overseas markets. One processor reported that the domestic market for vinyl is "strong." Another processor stated that their facility only gives away plastic because it has such low value while another is not recovering plastics.
- **The market for asphalt shingles has been slow to develop, but there is growth potential.** All interviewed processors noted that current markets for shingles are limited. One interviewee that takes small quantities of asphalt shingles stated that they have trouble finding a market even for those small amounts. This processor also noted that they were aware of the state's approval of asphalt shingle use in paving projects, but that local transportation authorities are reluctant to use asphalt shingles in this capacity.
- **Aggregate markets have always been a relatively cost-neutral (and sometimes cost-negative) opportunity for processors.** End markets for aggregates are primarily construction applications, like road base. All processors agreed that there is not a lucrative or even consistent market for recovered aggregates; one interviewee noted that the "money [from selling aggregates] barely pays for the diesel to turn the machines on." They are more likely to provide the service to satisfy their customers, who like to be able to take everything to the same facility.

New and Emerging Markets

- **There are new specifications for using shingles in paving for King County Department of Transportation projects.** To continue advancing the use of recycled asphalt shingles (RAS) in hot mix asphalt (HMA) on county roads, King County Road Services Division is planning to allow RAS to be used as part of the hot mix asphalt applied on one or more selected sections of roadway under its 2015/2016 pavement overlay program. The Road Services Division has also developed new specifications for RAS use. Depending on mix pricing and performance, the Division will consider expanding allowance of RAS mixes in future years. Because the specifications established by King County are often adopted by other local paving agencies in the region, the establishment of these new RAS specifications will likely make it easier for other agencies to allow RAS use on their own paving projects.
- **Potential new processing strategies for wood could open up a new market.** One processor is considering creating a low-margin composite board product using a very simple and efficient fabrication method. This interviewee noted that keeping manufacturing costs low is key to pricing this new product to compete against virgin materials in existing markets. This processor explained that only about 20% to 30% of customers are willing to pay more for recycled materials than for virgin, so this new product would need to be competitively priced—and produced in large quantities—to take advantage of the larger market.
- **Development of a salvaged lumber warehouse will increase diversion of valuable C&D materials.** This facility is a public-private partnership between the County and a private business; it plans to open late in 2015. This joint venture will consolidate, process, and disperse salvaged wood while taking advantage of the efficiencies gained

from a large volume of materials, streamlined processing, and contracted markets for value-added products.

Market Constraints and Barriers

- **Mill closures have limited the primary market for wood.** In particular, all processors point to the closure of Kimberly Clark as the biggest adverse impact on the hog fuel market. Since wood is one of the primary materials that processors recover from C&D loads, this market constraint is significant and impacts the entire C&D processing system. One processor stated, "everything hinges on wood markets and prices; a stable, long term home for wood is critical to our success."
- **A disposal ban for shingles is forthcoming, but markets remain limited.** Processors expressed doubts about whether there would be mature markets by the time Seattle's ban on asphalt shingles disposal begins mid-year 2015. Nationally, the market for recycled asphalt shingles has grown tremendously in the past few years, with RAS use increasing by 265% (from 702,000 tons to 1.86 million tons) between 2009 and 2012.[12] However, local demand for RAS has lagged behind the national average. A growing number of asphalt producers in the region are equipping their facilities to incorporate RAS into asphalt mixes and are increasingly using RAS mixes in private paving contracts, but public agencies (who are responsible for the majority of asphalt paving in the region) have been slower than many of their counterparts in other states to embrace RAS use on public roadways. The cost savings and environmental benefits achieved by using recycled asphalt shingles in paving may eventually lead to broader use of RAS mixes on public roads, but it is unlikely that local demand for RAS will swell substantially in the immediate future. Without greater RAS use by public agencies, it is unclear whether demand will be sufficient to absorb the increased supply of RAS resulting from a shingles disposal ban.

6.5 POTENTIAL PUBLIC SECTOR ACTIONS

Respondents identified several public sector opportunities to bolster C&D recycling. Recommendations from interviewees include ensuring the new system of bans and certified facilities is consistent across jurisdictions and markets exist for banned materials, continuing to support development of a salvaged lumber warehouse, and working with the local health department to have a balanced approach for recycling facilities. Details about these and other recommendations are provided below.

- **Continue to move forward with disposal bans and C&D processing facility certification.** C&D processors support bans because they have the capacity to process more feedstock, and they believe that facility certification will level the playing field. One processor suggested that in addition to driving more overall feedstock, bans may drive greater levels of source separation at C&D job sites. Multiple processors voiced their support for a facility certification program as a way to assure accurate reporting, facilitate third party facility inspections and assessments, and eliminate "sham recycling"

[12] Information Series 138, 3rd Annual Asphalt Pavement Industry Survey on Reclaimed Asphalt Pavement, Reclaimed Asphalt Shingles, Warm-mix Asphalt Usage: 2009-2012. National Asphalt Pavement Association, December 2013.

practices. King County should continue to partner with processors throughout the implementation processes for bans and certification.

- **Continue to partner with the City of Seattle to make facility certification reporting and standards, disposal bans, and other regulation details consistent across facilities and jurisdictions.** Most processors interviewed currently receive material from both King County and the City of Seattle. One processor stated that consistency would make regulatory compliance easier.
- **Ensure adequate markets for banned materials.** Multiple processors expressed concern about enacting bans for materials without steady markets. One processor worried that "excess material will drive down prices, due to traditional supply and demand economics." This same processor stated that "a jurisdiction-specific ban may permit local processors to charge such high tip fees that they won't need to be paid market prices for hog fuel, further depressing prices." Another processor noted that "recyclers…will find markets if they exist. Policies aren't going to do that." With that perspective in mind, processors also noted that LinkUp is "a good program to help the industry and potential end markets make connections." They felt that continuing the LinkUp program in light of material bans would support the processor/market connection process and facilitate processing and markets innovations in response to disposal bans for materials that are currently difficult to recycle.
- **Continue providing support for development of a salvaged lumber warehouse.** This creates a higher value market for clean wood coming off of jobsites.
- **Collaborate with other regulatory agencies to balance recycling goals with environmental health objectives and other concerns.** Public Health - Seattle & King County regulation enforcement can make it difficult for C&D processors to operate effectively and meet recovery goals. These challenges include more stringent enforcement around on-site "stockpiling" that make operating in King County more difficult than in surrounding counties.

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