GREEN SOLUTIONS
ENVIRONMENTAL CONSULTING

The Economy of Waste

Creating More Jobs from Clark County's Waste Stream

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INTRODUCTION

This report is intended to serve as a background document to support the Clark County Solid Waste Management Plan. This report provides a detailed description of the economic benefits associated with the solid waste system in Clark County, including:

- Market value for the additional recyclables that could be diverted from Clark County's trash.
- Jobs supported by various solid waste system activities associated with:
    - reusable and recyclable materials diverted from the waste stream, and
    - disposal of the remaining waste stream.
- Options for increasing the economic benefits from the solid waste system.

RECYCLING MARKET VALUE OF LANDFILLED MATERIALS

The market value for the recyclable materials that are still being trashed is over $6 million. This is equivalent to the value of 20 new homes, or the annual electrical bill for 4,600 homes, or 195,400 school lunches.

TABLE E-1
LANDFILLED AMOUNTS OF RECYCLABLE MATERIALS

CURBSIDE RECYCLABLE MATERIALS	LANDFILLED AMOUNT (annual tons, 2012)	MARKET VALUE (2013)	
		Market Price (per ton)	Total Market Value
Newspaper	1,580	$75-85	$126,400
Cardboard	7,090*	$100-120	$780,000
Mixed Waste Paper	10,880	$70-80	$816,000
Milk Cartons, Other	440	$0	$0
PET Bottles	1,810	$300-400	$633,500
HDPE Bottles	1,090	$300-400	$385,000
Bottles 3-7	140	$0	$0
Tubs	530	$0	$0
Aluminum Cans	760	$1,250-1,400	$1,007,000
Tin Cans	1,380	$150-200	$241,500
Scrap Metals	10,500*	$200	$2,100,000
Glass Bottles	4,290	$(-20)-0	$-42,900
Total Curbside Materials	**40,500**		**$6,044,490**

Note: The disposed amounts of cardboard and scrap metals have been adjusted for floor sorting by Waste Connections in 2012. Disposed amounts are annual tonnages for 2012.

Sources: Disposed amounts are from the 2012 Waste Stream Analysis for Clark County. Market prices were gathered from a variety of sources and are generally current as of late 2013.

It is important to note that Waste Connections, Inc. the contracted operator of the County's transfer stations is meeting its contractual requirements for recovering recyclables from the trash. Changing behavior to keep recyclables out of trash cans and dumpsters is the key piece to recovering some of the $6 million in potential market value.

CURRENT EMPLOYMENT LEVELS

A significant number of Clark County jobs are dependent on the solid waste system. Those 1,727 jobs contribute:

- $190 million worth of economic activity for solid waste / recycling / waste prevention (reuse, repair and rental, but excluding car and home repairs) businesses.
- Companies involved in some aspect of the solid waste system in Clark County paid over $52 million in wages in 2012. The average annual wage for the jobs in solid waste and recycling is $38,266 or 16% less than the county average of $44,446.

TABLE E-2
ECONOMIC ACTIVITY FOR THE CURRENT SOLID WASTE SYSTEM

Activity	Number of Firms	Percent	Sales ($1,000's)	Percent	Number of Employees	Percent
Reuse	92	23%	$16,777	9%	388	22%
Rental	72	18%	$29,935	16%	268	16%
Repair	193	49%	$39,187	20%	537	31%
Manufacturing and Wholesale	14	4%	$14,274	7%	119	7%
Collection	16	4%	$59,281	31%	203	12%
Processing and Disposal	6	2%	$31,960	17%	212	12%
Totals	393		$191,414		1,727	

Sources: Dun & Bradstreet, November 2013, supplemented with data from the cities of Camas and Vancouver, Clark County and the WA Utilities Transportation Commission (WUTC).

RECOMMENDED OPTIONS FOR ADDITIONAL EMPLOYMENT

There are a number of recommended options for increasing the economic benefits that can be derived from the solid waste system. These job creating opportunities are listed in the following table.

TABLE E-3
LOCAL JOB CREATION OPPORTUNITIES

Local Jobs Created	Option	Activity
6 (eventually up to 20 to 30)	WP2 and WP5	Program to recover reusable and repairable items at the transfer stations.
3	WP3	Program to recover and market construction materials at the transfer stations and from the construction & demolition (C&D) sort line at West Van Materials Recovery Center.
1	WP4	Edible food recovery
1-2	C1 and G1	Mandatory recycling
12	C2 and C3	Food waste collection with composting and/or anaerobic digestion

SECTION ONE
INTRODUCTION

A. SCOPE AND OBJECTIVES

This report is intended to serve as a background document to support the Clark County Solid Waste Management Plan. This report provides a detailed description of the economic benefits associated with the solid waste system in Clark County, including:

- Market value for the additional recyclables that could be diverted from Clark County's trash.
- Jobs supported by various solid waste system activities associated with:
    - reusable and recyclable materials diverted from the waste stream, and
    - disposal of the remaining waste stream.
- Options for increasing the economic benefits from the solid waste system.

This report was jointly prepared by Clark County staff and the environmental consulting firm of Green Solutions.

B. BACKGROUND

Significant amounts of resources and energy are invested in the manufacture, distribution, and sale of products to residential, commercial and institutional consumers. These products are frequently distributed in some type of packaging, such as a cardboard box, rigid plastic, or a flexible paper or plastic wrapper. Once the packaging or product has served its initial purpose and is ready to be discarded, the consumer has various options for how to handle it:

- Reuse, which is sometimes an option for packaging (such as cardboard boxes) but is more often an option for products (such as equipment, clothing and other goods).
- Recycling, which often is a more practical solution for handling packaging (such as bottles and cans) than reuse, and is also a good option for many products (such as newspapers, metal appliances, batteries and wood).
- Composting, similar to recycling in the sense that it is the next best option for materials that cannot be reused.
- Disposal, which may be the only option for some materials, but preferably this option is reserved for those products and packaging that cannot be reused or recycled.

These different options for discards create a variety of jobs and other economic benefits, generally in decreasing magnitude for the above list. Reuse options, for instance, generally preserve the greatest value for items such as clothing and tools, whereas recycling these items would still preserve some of the value. Disposal of these items preserves none of their inherent value, although still provides local jobs (all of these activities create jobs, with generally more jobs being created through reuse and recycling than for disposal, on a ton-by-ton basis).[1]

The above list of options for handling discards does not address some types of waste prevention. Waste prevention activities such as renting a product or repairing an already-owned product (both of which avoid the "consumption" a new product) are important strategies for solid waste management. These activities are generally included with reuse as a waste prevention strategy since all of these types of activities lead to a lower amount of discarded materials, and that is how these are addressed in the remainder of this report.

The following chapters of this report:

- Provides data on the economic value that is currently derived from the solid waste system in Clark County (in terms of jobs and the market value of recovered and landfilled materials),
- Evaluates options for increasing these benefits, and
- Provides recommendations for actions.

[1] According to a study conducted in 2001 for the California Integrated Waste Management Board, recycling activities create almost twice as many jobs as disposal (4.73 jobs per 1,000 tons for recycling versus 2.46 jobs per 1,000 tons for disposal).

SECTION TWO
MARKET VALUE FOR DIVERTED DISCARDS

A. INTRODUCTION

A major source of economic benefit associated with the solid waste system is the market value of the materials extracted from the waste stream, including reusables, recyclables, and organics. This market value is significant, although may not be high enough to allow some activities to operate at a net profit. For instance, there are sometimes questions raised about whether recycling "pays for itself." The market revenues from selling recyclables do help to defray collection and processing expenses, leading to a lower cost per ton of material recycled compared to disposal, but revenues typically do not pay for all of the collection, transportation and processing costs. Reuse, which preserves the greatest value for the objects being handled, typically does "pay for itself," although often by relying on participants to absorb at least part of the collection costs (such as by having them bring the materials to a central collection point).

In general, maximizing the economic benefit associated with reuse and recyclables is accomplished by:

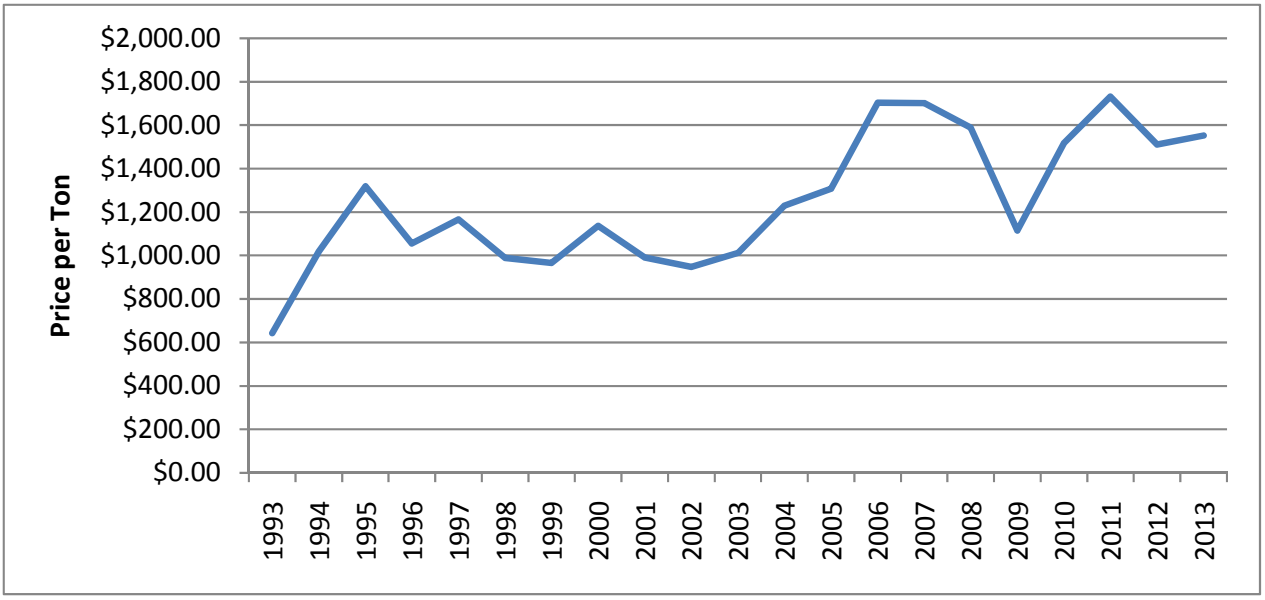
- Maximizing the amounts handled, thereby leading to increased revenues as well as increased efficiencies of scale.
- Maximizing the net value (i.e., achieving the best balance between market prices and the amount of processing needed to meet the specifications for specific markets).

Other factors of importance include long-term trends and the stability of markets, and the desire to use local markets to the maximum extent possible.

B. CURRENT MARKET CONDITIONS

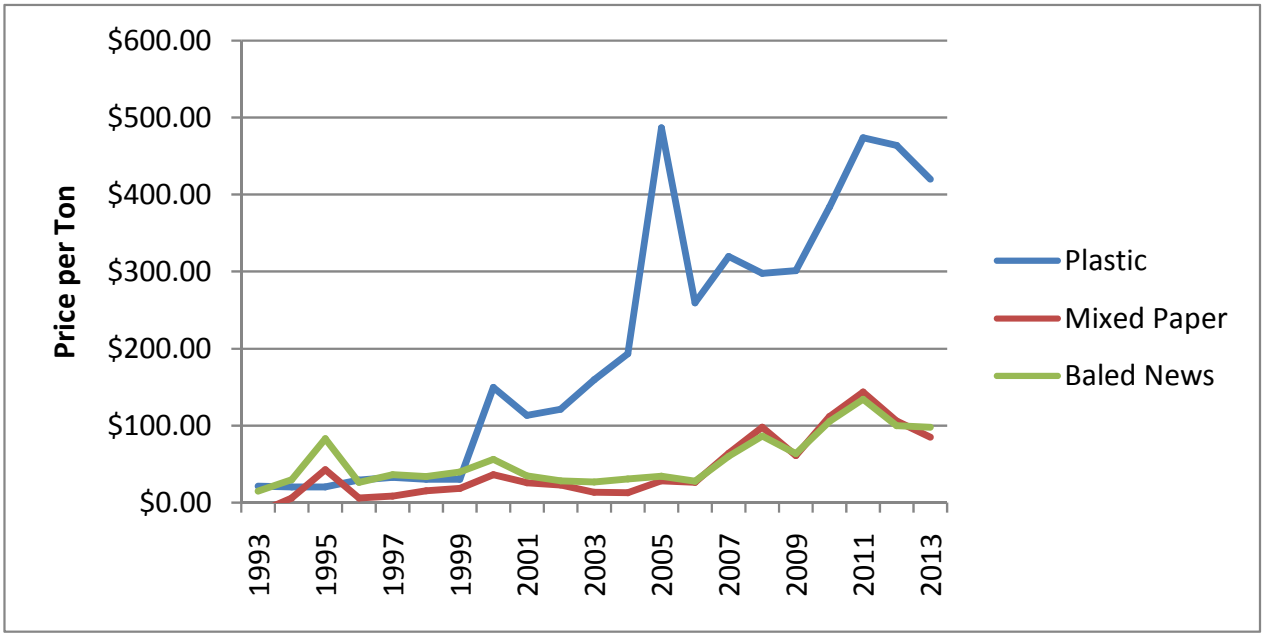
Market demand and prices for recyclables have fluctuated significantly over the past several years, just as prices for all commodities fluctuate with demand and other factors. Some recyclable materials have seasonal cycles in demand and prices, but all materials exhibit long-term trends with the possibility of sudden price spikes or dips. In some cases, long-term contracts with price floors can help moderate the swings in market revenues, but this isn't possible for all materials. Figures 1 and 2 show how the prices for aluminum cans and a few other materials collected from residential sources in the Pacific Northwest have fluctuated over the past 20 years. As can be seen in Figures 1 and 2, market prices dipped for most materials from 2008 to 2009 due to the slump in demand caused by the recession. In fact, some materials and markets went from all-time highs in 2008 to nearly all-time lows just six months later.

FIGURE 1
PRICE PAID FOR BALED ALUMINUM CANS (ANNUAL AVERAGES)



Source: Seattle Public Utilities website (original data source: American Metal Markets).

FIGURE 2
PRICES PAID FOR SELECT RECYCLABLE MATERIALS (ANNUAL AVERAGES)



Source: Seattle Public Utilities website (original data sources are Mill Trade Journal's Recycling Markets, Pulp and Paper Week, Recycling Times, and Waste News).

C. CHINA'S GREEN FENCE

Aside from the impact of the recession, market demand and prices for many of the common recyclable materials have been driven primarily by exports to China. For the past decade or longer, the willingness of Chinese companies to pay good prices for recyclable materials without insisting on high quality (in other words, their willingness to accept higher amounts of contamination) has been the best available market for many materials, but especially for paper and plastics from the west coast. The willingness of these companies to accept materials with high amounts of contamination forced local companies to find ways to do the same or go out of business. This trend synched up well with the move to single-stream recycling (where all materials are placed in one bin, a situation fortunately avoided by Clark County and the neighboring communities in the Portland metro area). The processing systems for single-stream recycling have difficulties separating recyclable materials to the same quality as the previous systems that relied more heavily on source-separation. The ability for Chinese companies to accept lower-quality materials may have come to an end in early 2013, however, due to the "Green Fence."

In early 2013, the Chinese government began enforcing rules on the quality of imported scrap materials. The main point of these rules is that contamination in recyclable materials shipped to Chinese ports must not exceed 1.5% contamination, and there is also zero tolerance for specific types of banned materials (such as medical wastes, food scraps, and e-waste). These rules led to the rejection of many U.S. shipments and have caused many changes within China. As of mid-October, 2013, enforcement of these rules had resulted in 54 charges for smuggling "foreign garbage" and 33,500 tons of materials seized. These rules had been "on the books" for several years, but had not been previously enforced. A change in the leadership for the Chinese government coupled with a number of well-publicized incidents of highly-contaminated materials being shipped to China led to these rules being enforced in what was initially called "Operation Green Fence" by U.S. exporters. The Chinese government intended for this to be a temporary phase of enforcement designed to stop the worst of the shipments, and this phase ended about November 30, 2013. It is expected that the rules will continue to be enforced for the foreseeable future, although at a lower level.

D. CURRENT MARKETS

The markets typically used in 2013 by recycling companies in the Clark County area are shown in Table 1. The markets shown in this table are the primary markets and in some cases small amounts of the materials are also being sold to other markets. Many of the markets are brokers who purchase materials from a variety of sources in the Northwest and then sell the materials to end-users in the U.S and other countries.

TABLE 1
CURRENT MARKETS FOR RECYCLED MATERIALS

Recyclable Materials	Primary Markets	Comments
Newspaper	Domestic markets and export markets	
Cardboard	Oregon and Washington domestic markets; and export markets	Mills process recycled cardboard back into new cardboard and other packaging.
Mixed Waste Paper	Export markets	Until recently, the mixed paper was marketed locally.
PET Bottles	Oregon domestic markets	Material sorted, granulated and washed and then sold as various grades of flaked products, primarily to export markets.
HDPE Bottles	Domestic and export markets	Some of the colored HDPE is used to make plastic pipe.
Aluminum Cans	Domestic markets	
Tin Cans	Domestic markets	
Glass Bottles	Domestic markets	

The value of the current recycling system in Clark County is very significant, both in terms of market revenues and the number of jobs supported. Whereas discussions about recycling programs often focus on curbside recycling and the other activities of the County's contractor for the transfer stations (Waste Connections), it should be kept in mind that there are a number of other companies involved in various aspects of recycling in the area and that their efforts also create a substantial amount of jobs and economic benefits. More information about the amounts of jobs and revenues created by these companies is shown in Attachment B (see especially Table B-3).

E. POTENTIAL FOR ADDITIONAL RECOVERY

The amount of materials diverted from Clark County's waste stream for recycling is substantial. According to the latest available figures from the Department of Ecology, 63.6% of the County's waste stream was recycled or diverted to other beneficial uses in 2011. There are, however, many more tons of recyclable materials that are still being landfilled. Table 2 shows the amounts of recyclable materials landfilled in 2012. For the materials that can be recycled through the curbside program, the current market value (as of late 2013) of these materials is also shown.

TABLE 2
LANDFILLED AMOUNTS OF RECYCLABLE MATERIALS

RECYCLABLE MATERIALS	LANDFILLED AMOUNTS, TPY (2012)			MARKET VALUE (2013)	
	Residential Sources	Non-Residential	Total for County	Market Price (per ton)	Market Value
CURBSIDE MATERIALS					
Newspaper	880	700	1,580	$75-85	$126,400
Cardboard	2,450	4,640*	7,090*	$100-120	$780,000
Mixed Waste Paper	5,930	4,950	10,880	$70-80	$816,000
Milk Cartons, Other	220	220	440	$0	$0
PET Bottles	1,030	780	1,810	$300-400	$633,500
HDPE Bottles	560	530	1,090	$300-400	$385,000
Bottles 3-7	70	70	140	$0	$0
Tubs	370	160	530	$0	$0
Aluminum Cans	420	340	760	$1,250-1,400	$1,007,000
Tin Cans	850	530	1,380	$150-200	$241,500
Scrap Metals	6,750	3,750*	10,500*	$200	$2,100,000
Glass Bottles	2,630	1,660	4,290	$(-20)-0	$-42,900
Total Curbside Materials	22,160	18,340	40,500		$6,044,500**
OTHER RECYCLABLES					
Film and Bags	6,800	5,880	12,680		
Recyclable Plastic Pkg	580	290	870		
Expanded Polystyrene	690	820	1,510		
Wood	830	6,120*	6,950*		
Gypsum	5,800	9,280	15,080		
Rubble	1,660	3,290*	4,950*		
Roofing (non-wood)	830	2,460	3,290		
Carpet, Padding	2,230	5,060	7,290		
Soil, Dirt	510	80	590		
Total Other Recyclables	20,490	31,520	52,010		
COMPOSTABLES					
Food Scraps	27,980	21,700	49,680		
Yard Debris	2,390	3,270	5,660		
Total Compostables	30,370	24,970	55,340		
TOTAL, ALL MATERIALS	**73,020**	**74,820**	**147,840**		

Notes: * The disposed amounts of cardboard, scrap metals, wood and rubble have been adjusted by the amount of these materials recovered through floor sorting by Waste Connections in 2012. Disposed amounts are annual tonnages for 2012.

** The total market value does not take into consideration that 100% recovery is not feasible and the loss revenue and jobs from reduced garbage tip fees and garbage collection if this material was recycled.

Sources: Disposed amounts are from the 2012 Waste Stream Analysis for Clark County. Market prices were gathered from a variety of sources and are generally current as of late 2013.

The figures for the disposed amounts of cardboard, scrap metals, wood and rubble were adjusted to account for the amounts of these materials recovered by Waste Connections through floor sorting. These amounts were subtracted from the non-residential figures because the non-residential loads are the primary source for these materials.

For the materials that can be recycled through curbside collection programs (and some commercial recycling programs), the amount of disposed recyclables shown in Table 2 are the equivalent of $6.0 million in lost market revenues. If all of the additional 153,940 tons of materials that could be composted, recycled or diverted to other beneficial uses could be diverted from the waste stream, the County's diversion rate would increase to over 80%. Diverting all of the remaining materials is not actually possible under any circumstances, but capturing more of these materials for recycling or composting could be accomplished through additional programs and/or public education and outreach activities. The potential for additional market revenues and other economic benefits would need to be weighed against the additional costs of collecting, processing and transporting these materials to markets. In addition, the diversion of significant additional tonnages to recycling would reduce the revenues received through tipping fees and potentially cause the loss of jobs in the disposal system (although there would be a net gain in jobs as recycling activities create almost twice as many jobs as disposal).

F. POTENTIAL FOR EXPANDED AND NEW MARKETS

The markets for recyclable materials are constantly undergoing changes in response to financial conditions, competition with other end-users, consumer demand, and other factors. A few highlights of planned and potential changes that could affect markets for Clark County recyclables include:

- Demand for recycled plastic could be increased by new approaches such as a bottle-to-bottle plant in Texas. Recycling plastic bottles back to bottles could help ensure supply and demand matches up better, but this has been a difficult process to implement to date. The new plant in Texas will consume about 1.6 billion bottles (40,000 tons) per year and will employ about 100 people. The plant will cost about $40 million to construct.
- The recent opening of Glass to Glass, a new plant in Portland, Oregon, may help with glass recycling in the area. This plant is a joint venture of Owens-Illinois and eCullet.

Advances in technology could create benefits for local economies if properly applied. Some of these innovations could include:

- Small-scale machines that convert waste plastics into oil,

- Biochar production using wood or other organic wastes, which could sequester carbon (thus reducing greenhouse gases) and also serve as a beneficial additive to compost and soils,
- Converting recycled plastics into a material that could be used in 3D printers, for local production of a variety of products with zero wastes produced,
- Composite plastic recycling,
- Encourage conditionally exempt vermicomposting operations to handle food scrap locally which could create local jobs.

Finally, the growing interest and investments in waste conversion technologies could lead to a processing system for solid wastes that would create jobs, energy, and useful products. These technologies are generally too preliminary to be actively pursued at this point.

SECTION THREE
CURENT EMPLOYMENT AND OPTIONS FOR THE SOLID WASTE SYSTEM

A. OVERVIEW

Each element of the solid waste management system provides a variety of economic benefits, in terms of creating or supporting jobs and providing other financial returns. These benefits often come at a cost to the subscribers and other users of the various elements of the solid waste system, although these costs are generally accepted as fees paid for services rendered. This in-flow of cash, coupled with the value of the materials handled (for non-disposal activities), is the economic engine for creating the jobs and other economic benefits associated with the solid waste system.

Understanding the economic benefits of the different solid waste management industries can help policy-makers better analyze how to identify opportunities for economic use of materials that can create more jobs, especially local jobs.

B. TYPES OF INDUSTRIES AND CURRENT EMPLOYMENT LEVELS

Applicable Types of Industries

For the purpose of identifying jobs associated with the solid waste management system, businesses can be grouped into six categories:

- Waste prevention, including three subcategories for:
    - reuse,
    - repairs, and
    - rental
- Wholesale and manufacturing, including selling and using large volumes of recyclable materials.
- Collection, including collection of recyclables, organics and waste.
- Processing and disposal, including non-collection activities associated with handling recyclables, organics and waste.

As shown above, waste prevention is defined to include reuse, repair and rental for the purpose of this analysis. Reuse is defined to consist of activities that maintain the original or similar purpose of an object or material without significant alteration. Reuse activities preserve the investment in energy and materials that has already been in a product, thus preventing the additional impacts to make a new product. Repair

extends a product's life so that it can be used longer, thus saving consumer funds that in theory can be spent or invested elsewhere, and delays the need to invest energy and resources in a new product. Rental activities also avoid the need to invest energy and materials in new products, and reduces consumer expenditures for items needed only once or temporarily. It can be argued that these activities have a net positive benefit locally.

Identifying the businesses involved in the above categories is made possible through the North American Industry Classification System[2] (NAICS). The NAICS is a system set up to categorize businesses (and also government agencies and institutions such as religious organizations) according to their primary activity. The NAICS system was adopted in 1997 to replace the Standard Industrial Classification (SIC) system. The NAICS system uses a series of codes, beginning with broad two-digit codes (such as codes 44 and 45 for Retail Trade, see also Appendix A), working down through 3-, 4- and 5-digit codes to 6-digit codes that identify a specific type of business (such as code 453310 for Used Merchandise Stores).

The specificity of the NAICS codes works well in most cases for identifying the businesses targeted by this report, but in some cases there is not a clear division between business activities based on reused/recycled materials versus new materials and goods. Hence, some NAICS codes include businesses that rely primarily on recycled materials as well as businesses that use only virgin feedstock. There are also many companies that use recycled materials for only part of their feedstock. Despite these minor flaws, the NAICS codes allow the use of various research tools, such as Bureau of Labor Statistics and the database maintained by Dun & Bradstreet (although unfortunately the Dun & Bradstreet data is still organized by the now-retired SIC system, requiring conversion of NAICS codes to the old system).

Dun & Bradstreet Data

Dun & Bradstreet maintains a database that attempts to include every company and many non-profit institutions in the United States. Much of this database is designed for marketing purposes, by including contact information for company owners and managers, and this part of the database was not needed for this project. More critical to this analysis was the data on the number of employees and the amount of sales, and the ability to sort this information by NAICS code (actually by SIC code) and geographic area. Equally important was the ability to list this information by company name, so that the information could be reviewed and non-applicable companies deleted from further analysis (or supplemented in some cases to include missing information). The analysis of the Dun & Bradstreet data is more fully explained in Appendix B, and the results of that analysis are shown in Table 3.

[2] **The North American Industry Classification System (NAICS) is the standard used by Federal statistical agencies in classifying business establishments for the purpose of collecting, analyzing, and publishing statistical data related to the U.S. business economy.**

TABLE 3
ECONOMIC ACTIVITY FOR THE CURRENT SOLID WASTE SYSTEM IN CLARK COUNTY

Activity	Number of Firms	Percent	Sales ($1,000's)	Percent	Number of Employees	Percent
Reuse	92	23%	16,777	9%	388	22%
Rental	72	18%	29,935	16%	268	16%
Repair	193	49%	39,187	20%	537	31%
Mfg and Wholesale	14	4%	14,274	7%	119	7%
Collection	16	4%	59,281	31%	203	12%
Processing/Disposal	6	2%	31,960	17%	212	12%
Totals	393		191,414		1,727	

Sources: Dun & Bradstreet data, November 2013, supplemented with data from the cities of Camas and Vancouver, Clark County and the WA Utilities Transportation Commission (WUTC).

Quarterly Census of Employment and Wages

Another source of data for the economic activity of firms involved in the solid waste system is the Quarterly Census of Employment and Wages (QCEW), which is prepared by the Bureau of Labor Statistics (a division of the U.S. Department of Labor). The QCEW uses NAICS codes to report the number of jobs and wages in a specific area (such as a county). Wage data is not collected by Dun & Bradstreet, so the QCEW data provides this important additional piece of information. A drawback for the QCEW data, however, is that it is not possible to "drill down" into the data to check on the actual companies included in each NAICS, and to adjust for companies that are not involved or only marginally involved in the solid waste system. Another drawback for the QCEW data is that it does not include all companies. Because the QCEW is based primarily on reports of wages paid, there are many companies that are not included in their database because the companies simply do not pay wages (at least not in the traditional sense), such as sole proprietors and single-member LLCs (and in some cases, joint LLCs operated by married couples).

A final disadvantage for the QCEW data is that data for some NAICS codes is not reported in order to protect the confidentiality of companies. This occurs in cases where there are only one or two companies in a code, or where there are only a few companies and the field is dominated by one or two large companies. For this study, this was a problem for the NAICS codes that address collection, processing (MRFs) and disposal, all of which are dominated by one company (Waste Connections) in Clark County.

Due to the above issues, the results shown in the following table are not as comprehensive as the Dun & Bradstreet data shown in Table 3, but are still considered useful because this data provides information about wages paid to workers in different types of jobs. As shown in Table 4, the companies involved in some aspect of the solid waste system in Clark County paid over $52 million in wages in 2012. For comparison purposes, the QCEW data shows that total employment in Clark County amounted to 129,865 private and public employees in 2012 and that those workers earned an average annual wage of $44,446.

TABLE 4
JOBS AND WAGES FOR THE CLARK COUNTY SOLID WASTE SYSTEM

Industry	Total Wages (in $1,000's)	Average Annual Wage
Sale of Used Goods	$9,064	$20,232
Rental	$5,573	$30,124
Repair	$23,413	$59,575
Collections	$9,368[1]	$43,054[1]
Manufacturing and Wholesale	$1,294[2]	$35,698[2]
Processing and Disposal	$4,057	$40,980
TOTALS	$52,769	$38,266

Notes: 1. 2008 data (most recent data available).
2. 2011 data (most recent data available).
All other data is from 2012.
Source: Quarterly Census of Employment and Wages, 2012.

C. POTENTIAL ECONOMIC OPTIONS

Waste Prevention Options

In general, waste prevention options are typically smaller in scale and more easily implemented than recycling and disposal options. Although smaller in scale, waste prevention activities provide substantial local benefits that go beyond the additional jobs created. The ability of local residents and businesses to buy used goods, repair tools and equipment, and to rent goods allows them to save money on those items and instead spend or invest the extra funds on other purposes. A recent study in Minnesota concluded that reuse activities help keep money local.[3] Activities such as rental and repairs, for instance, are personal services that are more likely to be performed in Clark County than the jobs created by manufacturing new products.

[3] As concluded in the report, *A Study of the Economic Activity of Minnesota's Reuse, Repair and Rental Sectors*, "reuse activities retain and recirculate money in a local economy, offer consumers more choices and stretch consumers' dollars."

Waste prevention options that address the question for this report, how to increase the jobs and other economic benefits associated with solid waste, can be summarized as increasing the:

- awareness of existing opportunities to purchase used goods, to rent equipment or other goods that are only needed once or infrequently, and to repair various products. An increased amount of business for the existing companies in Clark County would lead to more employment and revenues while saving money for the customers.
- access to new or existing opportunities for waste prevention.
- diversion of reusable or repairable products to new or existing companies.

Ideas on how to achieve these goals are listed below.

General Options

WP1) Public education and outreach : Public education and outreach could be conducted by Clark County and others to encourage residents and businesses to participate in new and existing opportunities for waste prevention, including buying used goods, repairs and rentals. Although this activity is already being conducted, a campaign targeted at the economic benefits of these activities could help increase the use of these opportunities. This campaign could include an effort to increase awareness of the current opportunities that exist in Clark County, such as the charities that collect reusable household goods and used building material stores.

Reuse Options

WP2) Increased diversion of reusables at transfer stations: A significant amount of materials are disposed as garbage that could instead be re-sold as used goods, including clothes and household items. In many cases, these items are not recognized as reusable by the customers, or the convenience factor makes disposal the preferred option. A combination of bins conveniently placed for customers to drop off reusable items, plus recovery from the floor, could potentially collect a substantial amount of material that could then be given or sold to a business or a non-profit enterprise for re-sale. It may even be possible for a company or non-profit to provide the staffing to implement this option, if the liability concerns of having that person work at the transfer stations can be addressed satisfactorily. That person could encourage people to use the drop-off bins and also check loads on the tipping floor for salvageable materials. If this program could be shown to be productive, it could employ one person near the entrance for CTR and possibly West Van, plus two workers on the floor recovering materials and additional people at a retail outlet for the recovered goods.

WP3) Recovery of construction materials from the transfer stations: There is some recovery of reusable construction materials going on currently at West Van (for lumber), but a great deal more could be done to recover various construction materials and products with the installation of the C&D sort line.

WP4) Edible food recovery: There is a huge amount of edible food disposed annually in the United States. Recent estimates have put the amount of wasted food as high as 40%, at a cost of $165 million per year. At the same time, up to 50 million Americans are going without enough food. Several steps could be taken to decrease the amount of wasted food in Clark County:

- Public education could be conducted to educate people about the meaning of "use by" dates (confusion about this point is believed to be part of the reason for disposal of edible foods), and to provide ideas for dealing with foods approaching the end of their shelf lives.
- Other ideas could be explored to encourage people to donate food to local food banks.

Repair Options

WP5) Recovery of repairable items from the transfer stations: In addition to the recovery of reusable items (see WP2), transfer station personnel or employees of private companies could salvage repairable products from the transfer station tipping floors. This activity could target products such as lawnmowers, appliances, bicycles and other durable goods that could be repaired and sold in Clark County.

WP6) Fix-it workshops: Fix-it workshops have been organized in Clark County (the DIY Fairs), and these are a good way to help people fix items while learning valuable skills and also building a sense of community. These workshops typically depend on businesses and organizations that volunteer their time. These workshops could be expanded as feasible.

Rental Options

WP7) Neighborhood-based tool and book libraries: Another growing trend that is relatively simple but effective, and that builds a sense of community, is small book-borrowing kiosks placed in front of people's homes. These kiosks can be supplied with used books from the home and neighbors, and can be managed without the need for strict check-out and return policies. Tool libraries would need to be more closely monitored, and so would need to be hosted at a community center or other public facility in Clark County.

Wholesale and Manufacturing Options

An industrial operation using recycled materials to manufacture new products could create a number of jobs, although attracting that type of industry to Clark County would take time and a package of incentives. Various possibilities exist for this, such as converting asphalt shingles to road base material; converting paper or glass to insulation; recycling specialty materials such as carbon fibers or local industrial scrap materials; and other possibilities. Large-scale paper and plastic manufacturing present less likely possibilities, since there is already capacity in the region for handling these materials.

One option that could be considered for manufacturing is:

M1) Manufacturing recycled goods locally: Industrial operations using recycled materials to manufacture new products could be encouraged to locate in Clark County. Existing economic incentives (tax breaks and other assistance, see also next section) could be used for this, plus supply assurances (if possible, depending on the material needed by the industry and whether Clark County can provide and supply and price assurances for that material).

Collection Options

The waste collection industry includes waste haulers and recycling collectors for materials from both commercial and residential sources. Since recycling creates more jobs than disposal, shifting additional tonnages from disposal to recycling will create more jobs. There are several ways to accomplish this:

C1) Increased recycling: Almost any approach that increases recycling is likely to create an increased number of jobs in Clark County. As other studies have shown, recycling creates more jobs than disposal on a ton-for-ton basis. Options for increasing recycling tonnages include mandatory recycling for garbage customers in Clark County unincorporated and rural areas. To increase the recycling base the county could consider mandatory garbage collection in urban growth areas for cities with mandatory garbage.

C2) Food waste collection with composting: There is huge potential for collecting and composting food waste in Clark County. Whether the food waste is collected with yard debris, such as Portland and many other areas are doing, or a separate collection system is used (as is being done in some areas for commercial food waste), the increased amount of organics for composting could create local jobs and additional revenues from sales of compost. The potential need for market development efforts to increase demand for the increased amount of compost should be examined prior to embarking on a new large-scale program to divert food waste.

C3) Food waste collection with anaerobic digestion: Instead of or in addition to collecting food waste for composting (see option C2, above), food waste could also be diverted to an anaerobic digester. This option may be best suited for the relatively clean food waste from commercial sources. The use of an anaerobic digester would still create compost and other marketable products, while also creating energy (generally in the form of methane or electricity if co-generation is used).

Processing and Disposal Options

In Clark County, the current employment in this sector includes local representatives of two landfills, employees of three transfer stations, and the jobs created by a few recycling companies whose primary activity is processing. Most of the jobs associated with landfilling waste are at the landfill, which in Clark County's case is not in the county. Plus landfilling creates relatively few jobs compared to recycling and other processing methods for waste, so any form of waste processing in Clark County would both create more jobs and would create jobs that are in the county. There are a number of interesting developments in this area, including:

D1) Conversion technologies: The term "conversion technologies" is currently applied in several ways, but in general is used to refer to thermal, biological and chemical processes that convert solid wastes into energy and other byproducts. Although somewhat promising, many of these processes are still highly experimental and not ready for large-scale applications. It would not be prudent for Clark County to invest in these technologies at this time, but this field should be monitored for possible implementation at a future date.

D2) MBT or MRBT: Mechanical/biological treatment (MBT) or Material Recovery and Biological Treatment (MRBT) are two different systems that employ a series of steps to process solid wastes, removing recyclables and composting organics. Both systems employ proven technologies that are arranged in a system that attempts to maximize the amount of materials that can be recovered or processed. In both systems, however, the resulting compost is not sold as a marketable material, but the composting is done to stabilize wastes prior to landfilling. This creates an additional expense which many would claim is unnecessary for landfills equipped with gas recovery. On the other hand, both systems would yield additional amounts of recyclable materials.

SECTION FOUR
OTHER INCENTIVES AND PROGRAMS

A. ECONOMIC INCENTIVES

In addition to the options outlined in the previous section, Clark County and other agencies could take a number of steps to encourage various waste diversion activities and recycling operations, including:

E1) **Tax incentives:** Tax incentives could include the suspension or reduction of property or other taxes, initially or over a longer term. This approach was a contributing factor for the Cascades mill expansion in St. Helens. Oregon, where the property taxes were abated for five years because Cascades agreed to pay their new workers wages and benefits that are at least 50%over the median wage in Columbia County.[4]

E2) **Grants:** Grants can encourage specific activities or to reduce specific types of expenses.

E3) **Zoning and special zones:** Zoning can be used to allow manufacturing in specific areas of the county, or at least to avoid barring specific operations from areas that might work well for a company. Special zones, such as "innovation zones'" "enterprise zones" or other zones can be established to clearly identify areas where tax breaks or other incentives are provided.

B. GOVERNMENT MANDATES AND OTHER PROGRAMS

In addition to the options outlined above, Clark County and other agencies could take a number of steps to encourage waste diversion activities and recycling operations, including:

G1) **Recycling and garbage mandates:** Mandatory recycling and garbage rules could increase the amount of materials being recycled in Clark County. These rules could apply to residential or commercial customers, or to both, but the rules for each would need to be structured and enforced differently.

G2) **Container deposits:** Container deposits, or bottle bills, are generally enacted on a statewide scale, not countywide, but Clark County's proximity to Oregon raises and interesting possibility for the county to enact a law similar to Oregon. If

[4] Although the Cascades mill in St. Helens does not use recycled paper, this example still illustrates one of incentives needed to attract heavy industry to an area.

nothing else, this would increase the county's apparent recycling rate by eliminating the "leakage" that occurs now as people take deposit containers from Clark County to Portland.

G3) **Procurement mandates:** Procurement requirements could increase the demand for recycled products and hence the value of recyclables, potentially leading to increased collections and jobs.

G4) **Recycled content requirements:** As with procurement mandates, requirements that specific products contain a minimum amount of recycled materials could lead to increased demand and jobs.

G5) **Disposal bans:** Disposal bans could be another method for increasing the amount of recyclables collected. Some municipalities have banned plastic grocery sacs which could include a revenue stream from the purchase of alternative bags e.g. paper or reusables.

G6) **Product stewardship:** Product stewardship programs can be implemented in such a way to create a separate collection, processing and marketing system for products that are currently handled through disposal, thus creating a range of new jobs. As with some of the above options, however, product stewardship programs are generally not enacted on a county level, but more typically on a statewide level.

SECTION FIVE
LOCAL JOB CREATION OPPORTUNITIES

A. INTRODUCTION

This section identifies the options that are considered to be feasible and could lead to local job creation.

B. RECOMMENDATIONS

The following options are recommended to be pursued:

WP2 and WP5) Recovery of reusable and repairable items from tipping floor: There are a number of ways to implement a program to increase the recovery of reusable and repairable items from the tipping floors of the transfer stations. This could be done by Waste Connections employees, with the recovered materials sold to the highest bidder, or outside staffing could be provided by a non-profit or a private company. In the long run, this approach could likely support a store the size of a typical Goodwill store, plus smaller stores for items such as lawnmowers, bicycles and appliances. In the near term, however, it may be necessary to demonstrate the value of this approach through a pilot program or short-term contract that would operate on a smaller scale, and possibly only at one of the transfer stations. Further work and discussions will be needed to determine the best approach initially.

WP3) Recovery of construction materials from the transfer stations: Diverting these materials could be accomplished using Waste Connections staff, with the diverted goods then sold to a reuse store, or diversion could be created by allowing a an employee of a private company to pull materials from the incoming waste stream. Either method should support at least three to four additional jobs in Clark County. The planned C&D sort line will increase capacity for recovery and is scheduled for 2014 per contractual language with Clark County.

WP4) Edible food recovery: The amount of edible food that is wasted is receiving increasing attention on a national and regional level. A number of steps have been identified as having potential to reduce this amount in Clark County, and taken together these steps could have substantial impact. The initial step for Clark County could be to hire a project employee to work on this issue and to help implement additional programs. The EPA is examining this issue and grants may be available to assist with the costs of such an employee. Although

initially this recommendation will create only one job, the potential economic benefits for the residents of Clark County are significant.

C1 and G1) Increased recycling through mandatory programs: Increasing the amount of materials handled through curbside and commercial recycling programs will create more jobs in Clark County and also create significant additional economic benefits from increased market revenues. Mandatory residential recycling for existing garbage customers would add an additional 5000 customers in the rural area which would equate to 1-2 driver jobs. If garbage were made mandatory along with recycling additional customers would be added. For example, the City of Battle Ground has about 1500 customer that don't subscribe to garbage or recycling service. Note some recycling would be offset by a reduction self-hauled drop off recycling. Mandatory commercial recycling would also make an impact on local jobs. There are about 3000 commercial Waste Connections customers that don't have recycling service (they may drop off or use another service provider). Based on the available data the additional 5,000 rural recycling customers would generate an addition 2000 tons of recycling. 1,000 tons of materials creates a net 2.27 additional jobs versus landfilling the same 1,000 tons. This could lead to an additional 4 to 5 jobs (not all of these jobs would be in Clark County). More jobs and other benefits could be created by recycling additional amounts of the "non-curbside" materials as well.

C2 and C3) Food waste collection with composting and/or anaerobic digestion: Diverting food waste to a composting facility or anaerobic digester could create jobs as well as marketable products (compost and energy if a digester is used).

C. PROJECTED ECONOMIC IMPACT

If implemented, the above recommendations are projected to create the additional number of jobs shown in Table 5. Creating new jobs and building local economic activity from trash is not something that can be done easily. It takes knowledgeable and experienced entrepreneurs who understand the technologies, markets and systems involved along with the risks inherent in developing or expanding new ventures. Well thought out business plans and consideration of commodity specifications and pricing/values all need to be thoroughly investigated and evaluated. This takes time, expertise and capital – even with that, it is not uncommon for waste related start-up ventures to fail. Most importantly it will take the community's commitment to source separate waste materials supported by new policies and solid waste management plan provisions.

TABLE 5
LOCAL JOB CREATION OPPORTUNITIES

New Jobs Created	Option	Activity
6 (eventually up to 20 to 30)	WP2 and WP5	Program to recover and sell reusable and repairable items from the tipping floor of the transfer stations.
3 to 4	WP3	Program to recover construction materials from the tipping floor of the transfer stations.
1	WP4	Edible food recovery
1-2	C1 and G1	Mandatory recycling
12	C2 and C3	Food waste collection with composting and/or anaerobic digestion

Notes: * Some but not all of these jobs would be in Clark County.

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APPENDIX A
LIST OF TWO-DIGIT NAICS CODES

The following list shows the main groups (two-digit codes) used for the North American Industry Classification System (NAICS). More details about this system, including the complete list of codes down to the six-digit level, can be found at the Census Bureau's website, www.census.gov/eos/www/naics.

2012 NAICS Code	2012 NAICS Title
11	Agriculture, Forestry, Fishing and Hunting
21	Mining, Quarrying, and Oil and Gas Extraction
22	Utilities
23	Construction
31-33	Manufacturing
42	Wholesale Trade
44-45	Retail Trade
48-49	Transportation and Warehousing
51	Information
52	Finance and Insurance
53	Real Estate and Rental and Leasing
54	Professional, Scientific, and Technical Services
55	Management of Companies and Enterprises
56	Administrative and Support and Waste Management and Remediation Services
61	Educational Services
62	Health Care and Social Assistance
71	Arts, Entertainment, and Recreation
72	Accommodation and Food Services
81	Other Services (except Public Administration)
92	Public Administration

APPENDIX B
CURRENT EMPLOYMENT LEVELS IN CLARK COUNTY

A. OVERVIEW

Each element of the solid waste management system provides a variety of economic benefits in terms of creating or supporting jobs and providing other financial returns. These benefits often come at a cost to the subscribers and other users of the various elements of the solid waste system, although these costs are generally accepted as fees paid for services rendered. This in-flow of cash, coupled with the value of the materials handled (for non-disposal activities), is the economic engine for creating the jobs and other economic benefits associated with the solid waste system.

Understanding the economic benefits of the different solid waste management industries can help policy-makers better analyze how to identify opportunities for economic use of materials that can create more jobs, especially local jobs.

B. APPLICABLE TYPES OF INDUSTRY

For the purpose of identifying jobs associated with the solid waste management system, businesses can be grouped into six categories:

- Waste prevention, including subcategories for:
    - reuse,
    - repairs, and
    - rental
- Wholesale and manufacturing, including selling and using large volumes of recyclable materials.
- Collection, including collection of recyclables, organics and waste.
- Processing and disposal, including non-collection activities associated with handling recyclables, organics and waste.

Identifying the businesses involved in the above categories is made possible through the North American Industry Classification System[5] (NAICS). The NAICS is a system set up to categorize businesses (and also government agencies and institutions such as religious organizations) according to their primary activity. The NAICS system was

[5] **The North American Industry Classification System (NAICS) is the standard used by Federal statistical agencies in classifying business establishments for the purpose of collecting, analyzing, and publishing statistical data related to the U.S. business economy.**

adopted in 1997 to replace the Standard Industrial Classification (SIC) system. The NAICS system uses a series of codes, beginning with broad two-digit codes (such as codes 44 and 45 for Retail Trade, see also Appendix A), working down through 3-, 4- and 5-digit codes to 6-digit codes that identify a specific type of business (such as code 453310 for Used Merchandise Stores).

The specificity of the NAICS codes works well in most cases for identifying the businesses targeted by this report, but in some cases there is not a clear division between business activities based on reused/recycled materials versus new materials and goods. Hence, some NAICS codes include businesses that rely primarily on recycled materials as well as businesses that use only virgin feedstock. There are also many companies that use recycled materials for only part of their feedstock. Despite these minor flaws, the NAICS codes allow the use of various research tools, such as Bureau of Labor Statistics and the database maintained by Dun & Bradstreet (although unfortunately the Dun & Bradstreet data is still organized by the now-retired SIC system, requiring conversion of NAICS codes to the old system).

The NAICS codes for each of the above six categories are identified below.

Waste Prevention

For the purpose of this analysis, waste prevention is defined to include reuse, repair and rental. Reuse is defined to consist of activities that maintain the original or similar purpose of an object or material without significant alteration. Reuse activities preserve the investment in energy and materials that has already been in a product, thus preventing the additional impacts to make a new product. Repair extends a product's life so that it can be used longer, thus saving consumer funds that in theory can be spent or invested elsewhere, and delays the need to invest energy and resources in a new product. Rental activities also avoid the need to invest energy and materials in new products, and reduces consumer expenditures for items needed only once or temporarily. It can be argued that these activities have a have a net positive benefit locally.

Table B-1 shows the types of companies involved in waste prevention activities and the corresponding NAICS codes. These are the codes that will be used to gather data on the number of people employed by these businesses. By relying on reported data for the numbers of jobs and amount of sales, Table B-1 does not include the large amount of waste prevention activity that occurs through:

- services such as eBay, Craigslist and similar activities,
- person-to-person sales and gifts, including garage sales, and
- some types of rentals and repairs.

TABLE B-1
TYPES OF BUSINESSES INVOLVED IN WASTE PREVENTION

NAICS Code	Type of Business
NAICS Groups 44-45, Retail Trade	
441320	Tire dealers (used sales & repairs only)†
453310	Used merchandise stores
NAICS Group 52, Finance and Insurance	
522298	Pawn shops
NAICS Group 53, Real Estate Rental and Leasing	
532210	Consumer electronics & appliances rental
532220	Formal wear & costume rental
532230	Video tape & disc rental
532291	Home health equipment rental
532292	Recreational goods rental
532299	All other consumer goods rental
532310	General rental centers
532420	Office machinery & equipment rental
532490	Other machinery & equipment rental
NAICS Group 81, Other Services	
811211	Consumer electronics repair
811212	Computer & office machine repair
811213	Communication equipment repair
811219	Other electronic & precision equip. repair
811310	Commercial & industrial machinery repair
811411	Home & garden equipment repair
811412	Appliance repair
811420	Reupholstery & furniture repair
811430	Footwear & leather goods repair
811490	Other personal & household goods repair
812331	Linen supply
812332	Industrial launderers

Notes: 1. Does not include sales or repairs of used cars and other vehicles. Shading denotes rental companies (green), repair services (orange), and sales of used goods (yellow).
2. Linen Supply & Industrial Launders are primarily for "renting" linens and uniforms

A large amount of reuse and repair activity has been purposely excluded from Table B-1 by excluding sales and repairs of used cars and other used vehicles. Sales of used tires, retreading tires, and re-refining motor oil are included because tires and oil are often handled as part of the solid waste system, but cars and other vehicles are typically handled separately from solid waste and so were not included in the analysis.

Local companies that are included in this analysis are involved in collecting and selling used goods, such as books, appliances, antiques, and clothes, or repairing used goods for resale, including reupholstering furniture, and rental of a wide range of products. Examples of companies that fall into these categories include Goodwill, Habitat for Humanity, Paws-n-claws Thrift shops, and Empower Up.

Wholesale and Manufacturing

This group contains industries involved in the production of recycled materials that are sold to be used again in manufacturing, and those firms that actually use these materials to produce new products from recycled materials. A common example is the smelting of scrap iron into useable ingots, which may be sold to manufacturers. Table B-2 shows the NAICS codes that specifically address wholesale and manufacturing activities for recycling, but several codes that include recycling activities are not shown in this table. For instance, Code 322210 (pulp mills) includes deinking recovered paper as well as several other categories dealing with virgin materials. Likewise, 327213

TABLE B-2
TYPES OF BUSINESSES INVOLVED IN RECYCLING AND DISPOSAL

NAICS Code	Type of Business	Comments
NAICS Groups 31-33, and 42, Manufacturing and Wholesale Trade		
311613	Rendering	
324191	Oil re-refining	
326212	Tire re-treading	
423930	Recyclable material merchant wholesalers	Includes all types of materials (paper, plastic, oil, rags, tires, metals, etc.).
NAICS Group 48, Transportation		
483211	Inland water transportation	
484230	Specialized freight	Includes solid and hazardous waste trucking.
NAICS Group 56, Administrative and Waste Management Services		
562111	Solid waste collection	
562119	Other waste collection	
562212	Solid waste landfill	These categories may include some types of businesses not involved with solid waste.
562213	Solid waste incinerators	
562219	Other nonhazardous waste treatment	
562920	Material recovery facilities	
562998	Other misc. waste management services	

Notes: Shading denotes manufacturing and wholesale companies involved in recycling (blue), collection and transportation companies (purple), and processing and disposal companies (gray).

(glass manufacturing) includes recovered and virgin materials, 325991 (custom compounding of plastic resins) includes compounding and formulating plastics from recycled as well as virgin resins, and 314999 (other miscellaneous textile product mills) includes reclaimed wool, recovered fibers and wool waste processing among several other categories that do not involve recycled materials. Code 311613 (rendering and meat byproduct processing) also includes some companies that are handling materials that would typically be classified as food waste. Fortunately, most of the companies that would fall into these "mixed" codes are large businesses that would be well-known locally. To address the potential loss of data from these codes, Clark County staff assembled a list of known local companies and requested that Dun & Bradstreet staff check their NAICS. The unrelated companies in these NAICS were deleted from further analysis. This step also helped to gather data on companies that have been assigned an incorrect NAICS code in the Dun & Bradstreet database (a problem that occurs with a small percentage of the businesses).

Other studies have examined the economic impact of employment and products created by manufacturing facilities that use recycled materials for part of their feedstock. Some of these studies have concluded that it is unclear how much of the employment and revenue generated by these activities can justifiably be attributed to the recycling industry. If, for example, a paper mill uses 30% recycled materials, it could be possible to attribute 30% of that mill's employment to the recycled manufacturing sector. In the absence of recycled materials, however, that same paper mill would likely still have about the same number of employees to make about the same amount of paper from virgin material feedstock. If employment at a company would be mostly unchanged in the absence of a recycled market, it seems unfair to attribute that employment to the recycling industry. Hence, this analysis does not attempt to parse manufacturing data to allocate economic benefits from this sector partly to recycling (although in reality there may be no companies in Clark County where this is a concern).

Local examples of wholesale and manufacturing companies include Pacific Coast Shredding, McFarlane's Bark, and Colson's Rendering.

Collection

Also shown in Table B-2 is the one NAICS code that addresses solid waste collection (code 562111, for solid waste collection). Although the title for this category is "solid waste" collection, it also includes collection of recyclables (and presumably organics) and the operation of transfer stations. The official definition for this code is:

> *"This U.S. industry comprises establishments primarily engaged in one or more of the following: (1) collecting and/or hauling nonhazardous solid waste (i.e., garbage) within a local area; (2) operating nonhazardous solid waste transfer stations; and (3) collecting and/or hauling mixed recyclable materials within a local area."*

The waste collection industry includes waste haulers and recycling collectors for materials from both commercial and residential sources. Local companies in this category include Waste Connections and Interstate Dropbox.

This analysis includes two transportation codes and "other waste collection" (562119) in the collection category. The transportation codes are for moving waste by barge (code 483211) and by truck (code 484230, which includes trucking a wide variety of materials of which only a few are related to solid and hazardous wastes). Data for companies that fall into the two transportation codes is available through Dun & Bradstreet, but the amount of activity related to the solid waste industry was not easily available and so these are not actually included in the results. For "other waste collection," there appears to be one recycling company with this code and so this code is included in the results. In theory, the category for hazardous waste collections (code 562112) should not include companies applicable to this analysis, but this code was still checked to ensure no companies were overlooked. Since there are no companies with this code in Clark County, it was eliminated from further analysis.

Processing and Disposal

The NAICS codes related to processing and disposal of waste, recyclables and organics are also shown in Table B-2. Most of the activities related to processing and disposal are in NAICS Group 56. Several codes from NAICS Group 562 (Waste Management and Remediation Services) are not included in Table B-2, however, because the codes are clearly not related to solid waste, including 562211, hazardous waste treatment; 562910, remediation services; and 562991, septic tank services. For the codes that were included in the data-gathering research, the businesses listed for these codes were reviewed to ensure that the appropriate companies were included in the analysis.

In Clark County, employment in this sector includes representatives of two landfills, transfer stations, and a few recycling companies whose primary activity is processing.

C. LOCAL EMPLOYMENT LEVELS

Dun & Bradstreet Data

The results gleaned from the Dun & Bradstreet database are shown in Table B-3. These results are aggregated according to the six categories of companies identified earlier (wholesale and manufacturing, collection of recyclables and waste, processing and disposal, and three categories for waste prevention). This has been done in part to protect the confidentiality of data for some of the companies.

In addition to the companies included in Table B-3, there are at least another 85 firms for which a portion of their sales are for used goods that are handled in addition to the

TABLE B-3
ECONOMIC ACTIVITY FOR THE CURRENT SOLID WASTE SYSTEM IN CLARK COUNTY

Activity	Number of Firms	Percent	Sales ($1,000's)	Percent	Number of Employees	Percent
Reuse	92	23%	16,777	9%	388	22%
Rental	72	18%	29,935	16%	268	16%
Repair	193	49%	39,187	21%	537	31%
Mfg and Wholesale	14	4%	14,274	8%	119	7%
Collection	16	4%	59,281	31%	203	12%
Processing/Disposal	6	2%	30,558	16%	212	12%
Totals	393		190,012		1,727	

Sources: Dun & Bradstreet data, November 2013, supplemented with data from the cities of Camas and Vancouver, Clark County and the WA Utilities Transportation Commission (WUTC).

new products that are their primary stock. Likewise for rentals and repairs, there are at least another 108 firms that conduct some repairs as part of their business.

Quarterly Census of Employment and Wages

Another source of data for the economic activity of firms involved in the solid waste system is the Quarterly Census of Employment and Wages (QCEW), which is prepared by the Bureau of Labor Statistics (a division of the U.S. Department of Labor). The QCEW uses NAICS codes to report the number of jobs and wages in a specific area (such as a county). Wage data is not collected by Dun & Bradstreet, so the QCEW data provides this important additional piece of information. A drawback for the QCEW data, however, is that it is not possible to "drill down" into the data to check on the actual companies included in each NAICS, and to adjust for companies that are not involved or only marginally involved in the solid waste system. For example, for the NAICS code 441320, tire dealers (the first type of business shown in Table B-1), the QCEW data on jobs and wages is primarily for companies that sell new tires, and it is not possible to eliminate those in order to adjust for only those companies that sell used tires. In other words, the value of the QCEW data hinges on how well each NAICS code applies to the types of companies being researched here. Hence, not all of the NAICS codes used for the Dun & Bradstreet research could be used for the QCEW data. Another significant drawback for the QCEW data is that it does not include all of the companies. Because the QCEW is based primarily on reports of wages paid, there are many companies that are not included in their database because the companies do not pay wages (at least not in the traditional sense), such as sole proprietors and single-member LLCs (and in some cases, joint LLCs operated by a married couple). A significant number of companies in the waste prevention industries (sales of used

goods, repairs and rentals) have only one or two employees and likely fall into this situation.

A final disadvantage for the QCEW data is that data for some NAICS codes is not reported in order to protect the confidentiality of companies where there are only a few companies in the category. This occurs in cases where there are only one or two companies in a code, or where there are only a few companies and the field is dominated by one or two large companies. For this study, this was a problem for the NAICS codes that address collection, processing (MRFs) and disposal, all of which in Clark County are dominated by Waste Connections.

Due to the above issues, not all of the NAICS codes shown in Tables B-1 and B-2 can be researched for Clark County in the QCEW database. Hence, the results shown in the following table are not as comprehensive as the Dun & Bradstreet data shown in Table B-3, but are still considered useful because this data provides information about wages paid to workers in different types of jobs.

Table B-4 summarizes the QCEW data for Clark County. As shown in Table B-4, this source of information shows that the companies involved in the solid waste system in Clark County paid their employees over $52 million in wages in 2012. For comparison purposes, the QCEW data shows that total employment in Clark County amounted to 129,865 private and public employees in 2012 and that those workers earned an average annual wage of $44,446.

TABLE B-4
JOBS AND WAGES FOR SOLID WASTE SYSTEM IN CLARK COUNTY

Industry	Total Wages (in $1,000's)	Average Annual Wage
Sale of Used Goods	$9,064	$20,232
Rental	$5,573	$30,124
Repair	$23,413	$59,575
Collections	$9,368[1]	$43,054[1]
Manufacturing and Wholesale	$1,294[2]	$35,698[2]
Processing and Disposal	$4,057	$40,980
TOTALS	$52,769	$38,266

Notes: 1. 2008 data (most recent data available).
2. 2011 data (most recent data available).
All other data is from 2012.

Source: Quarterly Census of Employment and Wages, 2012.