

C1. STRATEGIES EVALUATED IN THE SHORT-TERM SCENARIO

C1.1 Residential MSW

Strategy Name	Description
Waste reduction and reuse education (single-family, residents and self-haul residential)	Provide targeted education campaigns on source reduction or waste prevention opportunities. This strategy includes developing three marketing campaigns to be conducted over the planning period for the following: curbside recyclables; hard-to-recycle materials such as bulky, durables, electronics, and textiles; and other materials. This strategy relies primarily on using existing messaging channels such as websites, newsletters, mailings, social media, and media outreach.
Partnerships with local reuse retailers (single-family and multifamily)	Partner with local reuse organizations and other retailers to expand drop-off opportunities for reusable products and materials. Drop-off can occur at retail locations and at disposal sites.
<p>Expanded residential marketing program</p> <p>Also includes:</p> <ul style="list-style-type: none"> • Youth education • Partnerships with schools • Engage homeowner associations (via resident champion program) 	<p>Expand and improve comprehensive recycling education campaigns by including images in materials and signage and ensuring consistency of terminology. Rely on community-based social marketing methods in design of materials.</p> <p>This strategy includes two broad marketing campaigns, one for curbside recycling and one for yard waste. Marketing materials produced for this campaign will be items such as mailers and handouts and new website content. This strategy also includes a youth education campaign at local schools and targeted multifamily outreach through a resident champion program. Except for direct in-person engagement at schools, this strategy primarily relies on using existing messaging channels such as websites, newsletters, mailings, social media, and media outreach.</p>

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Strategy Name	Description
<p>County-wide service level standards for single-family recycling</p> <p>Combines:</p> <ul style="list-style-type: none"> • Standardized bins and labels/signage • Provide carts for recycling • Embedded/bundled fees 	<p>Expand the county-wide service level standards to set standards for container types, signage, and colors and embed recycling collection fees in the cost of garbage collection. As part of this strategy, provide recycling carts (instead of bins) to all single-family households that currently do not have recycling service and or who currently have service using a tub/bin. For households with current cart-based service, apply new adhesive labels to all existing recycling carts to standardize them.</p>
<p>Signage standards and adequate infrastructure for multifamily</p> <p>Combines:</p> <ul style="list-style-type: none"> • Standardized bins and labels/signage • Adequate infrastructure 	<p>Establish standards for container types, colors, and signage or labels. Also establish voluntary guidelines on recycling and composting infrastructure and service levels based on the number of units at the property and on co-locating containers for garbage, recycling, and composting.</p>
<p>Multifamily technical assistance</p>	<p>Provide on-site education and assistance to multifamily properties. This strategy uses in-person engagement strategies, including direct assistance to property managers and door-to-door resident outreach.</p>
<p>Yard waste disposal ban enforcement</p>	<p>Enforce the existing yard waste landfill disposal ban. This strategy requires additional staff time for enforcement activities.</p>
<p>Bulky waste processing of “junk and bulk trash”</p>	<p>Require materials collected as bulky waste to be bulky waste processed to recover recyclable materials. This PPI affects the “junk and bulk trash” collection that the Urban Services District provides to residents three times per year.</p>

C1.2 Industrial/Commercial/Institutional MSW

Strategy Name	Description
Waste reduction and reuse education for businesses (ICI and self-haul ICI)	Provide targeted education campaigns on source reduction or waste prevention opportunities. This strategy includes two campaigns over the planning period, one on food waste prevention and one on reduction and reuse of electronics, bulky, and other materials. This strategy uses social marketing methods in the design of materials and primarily relies on using existing messaging channels such as websites, newsletters, mailings, social media, and media outreach.
Expanded business marketing program	Expand and improve comprehensive recycling education campaigns by including images in materials and signage and ensuring consistency of terminology. This strategy includes two broad marketing campaigns, one to promote food scrap collection and the other to promote curbside recycling. This strategy uses social marketing methods in the design of materials and primarily relies on using existing messaging channels such as websites, newsletters, mailings, social media, and media outreach. It also includes developing and distributing toolkits to business owners.
Signage standards and adequate infrastructure for businesses Combines: <ul style="list-style-type: none"> • Standardized bins and labels/signage • Adequate infrastructure 	Establish standards for container types, colors, and signage or labels. Also establish voluntary guidelines on recycling and composting infrastructure and service levels based on the business type and size and on co-locating containers for garbage, recycling, and composting.
Business technical assistance	Provide comprehensive on-site assistance to businesses and other ICI generators. This strategy primarily uses in-person engagement and includes not only assisting businesses with obtaining containers and setting up collection service, but also providing direct outreach and education to employees.
Business awards and recognition	Continue to implement award and recognition programs and expand the program beyond food-generating businesses in the Central Business District.
Yard waste disposal ban enforcement	Enforce the existing yard waste landfill disposal ban. This strategy requires additional staff time for enforcement activities.

C1.3 Self-hauled Materials

Strategy Name	Description
Self-haul waste reduction and reuse education	<i>This strategy is conducted for all residents and businesses and described above in the respective residential and ICI sections.</i>
Expanded marketing program for self-haul	Expand and improve comprehensive recycling education campaigns. Include images in materials and signage and ensure consistency of terminology. This strategy includes four marketing campaigns, targeting broad recyclables, yard waste and other organics, recyclable metals, and other materials (such as bulky items and textiles). This strategy uses social marketing methods in the design of materials and primarily relies on using existing messaging channels such as websites, brochures at self-haul sites, social media, and media outreach.
Partnerships with local reuse retailers (self-haul)	Partner with local reuse organizations and other retailers to expand drop-off opportunities for reusable products and materials. Drop-off can occur at retail locations and at disposal sites.
County-wide service level standards for self-haul facilities	Establish county-wide service level standards that require disposal sites that accept self-haul garbage to provide adequate infrastructure for accepting curbside recyclables, yard waste, clean wood, metals, and bulky/durable/textile items for diversion at fees less than the fee for garbage disposal. Items collected as bulky waste must be sent for dry waste processing.
Combines: <ul style="list-style-type: none"> • Adequate infrastructure • Standardized facility signage and containers • Bundled fees 	Standards also include regionally standardized signage systems at self-haul facilities. Standardizing signage systems includes updating the signage across Louisville/Jefferson County’s five disposal self-haul facilities to use standardized colors, language, and messaging.
Self-haul separation requirement	Require self-haul customers to separate materials for recycling and yard waste composting at transfer and disposal sites. This strategy requires additional staff time for enforcement activities. This strategy uses the infrastructure obtained through the county-wide service level standards for self-haul facilities.
Yard waste disposal ban enforcement	Enforce the existing yard waste landfill disposal ban. This strategy requires additional staff time for enforcement activities.

C1.4 Construction and Demolition Materials

Strategy Name	Description
C&D debris waste reduction and reuse education	Provide targeted education and outreach on waste reduction opportunities, such as salvage, deconstruction, and construction techniques that minimize waste. This strategy includes one campaign over the planning period, targeting wood and other C&D materials. This strategy uses social marketing methods in the design of materials and primarily relies on using existing messaging channels such as websites, newsletters, mailings, social media, and media outreach.
Expanded C&D debris marketing program	Expand and improve comprehensive recycling education campaigns by including images in materials and signage and ensuring consistency of terminology. Rely on community-based social marketing methods in design of materials. This strategy assumes one broad marketing campaign over the planning period. This strategy uses social marketing methods in the design of materials and primarily relies on using existing messaging channels such as websites, newsletters, mailings, social media, and media outreach. It also includes developing and distributing toolkits to construction business owners.
Promoting green building	Promote LEED and green building practices. This strategy includes development of a toolkit for developers and construction businesses that promotes LEED and green building. This strategy uses social marketing methods in the design of materials and primarily relies on using existing messaging channels such as websites, newsletters, mailings, social media, and media outreach.
Reuse materials in road construction	Incorporate more reusable and recycled materials into municipal road construction and maintenance projects. This strategy assumes that the existing capacity for processing asphalt roofing into materials for road construction and maintenance projects is sufficient and that no additional infrastructure is required.
Yard waste disposal ban enforcement	Increase enforcement of yard waste disposal ban. This strategy requires additional staff time for enforcement activities.
C&D ordinance that requires processing of all C&D materials	Implement C&D ordinances that require all C&D debris to be sent for processing. This strategy particularly targets cardboard, metals and appliances, asphalt shingles, clean wood, and aggregates.

C2. TONNAGE GROWTH PROJECTIONS (BUSINESS AS USUAL)

The following tables present county-wide tonnages by year and waste stream in the business-as-usual scenario without implementing new strategies.

Year	Diversion Rate (including contamination)	Recoverability of Disposal (disposed curbside recyclables, yard waste, and metals)	Tons Generation (excl. source reduction)	Recovery	Beneficial Use	Contamination	Disposal	Source Reduction
Overall				3,485,246	5,845,427	100,718	9,969,896	-
2016	48.7%	67.9%	1,721,017	310,462	518,324	8,883	883,347	-
2017	48.7%	67.9%	1,729,778	311,759	521,010	8,940	888,070	-
2018	48.6%	67.8%	1,738,540	313,055	523,697	8,996	892,792	-
2019	48.6%	67.8%	1,747,302	314,352	526,384	9,052	897,514	-
2020	48.6%	67.8%	1,756,063	315,648	529,070	9,108	902,236	-
2021	48.6%	67.8%	1,764,303	316,894	531,583	9,161	906,665	-
2022	48.6%	67.8%	1,772,542	318,140	534,095	9,213	911,094	-
2023	48.6%	67.8%	1,780,781	319,386	536,607	9,265	915,523	-
2024	48.6%	67.8%	1,789,021	320,632	539,119	9,317	919,952	-
2025	48.6%	67.8%	1,797,260	321,879	541,631	9,369	924,381	-
2026	48.6%	67.8%	1,804,680	323,038	543,907	9,414	928,320	-

C2. TONNAGE GROWTH PROJECTIONS (BUSINESS AS USUAL)

Year	Diversion Rate (including contamination)	Recoverability of Disposal (disposed curbside recyclables, yard waste, and metals)	Total Tons Generation (excl. source reduction)	Total Tons				
				Recovery	Beneficial Use	Contamination	Disposed	Source Reduction
Single-Family Residential				706,941	-	57,705	3,001,777	-
2016	20.3%	67.7%	329,215	61,792	-	5,044	262,379	-
2017	20.3%	67.7%	331,953	62,306	-	5,086	264,561	-
2018	20.3%	67.7%	334,692	62,820	-	5,128	266,744	-
2019	20.3%	67.7%	337,430	63,334	-	5,170	268,926	-
2020	20.3%	67.7%	340,169	63,848	-	5,212	271,109	-
2021	20.3%	67.7%	342,663	64,316	-	5,250	273,097	-
2022	20.3%	67.7%	345,157	64,784	-	5,288	275,085	-
2023	20.3%	67.7%	347,652	65,253	-	5,326	277,073	-
2024	20.3%	67.7%	350,146	65,721	-	5,365	279,061	-
2025	20.3%	67.7%	352,640	66,189	-	5,403	281,049	-
2026	20.3%	67.7%	354,706	66,577	-	5,434	282,695	-
Multifamily Residential				-	-	-	562,386	-
2016	0.0%	72.4%	49,157	-	-	-	49,157	-
2017	0.0%	72.4%	49,566	-	-	-	49,566	-
2018	0.0%	72.4%	49,975	-	-	-	49,975	-
2019	0.0%	72.4%	50,384	-	-	-	50,384	-
2020	0.0%	72.4%	50,793	-	-	-	50,793	-
2021	0.0%	72.4%	51,165	-	-	-	51,165	-
2022	0.0%	72.4%	51,537	-	-	-	51,537	-
2023	0.0%	72.4%	51,910	-	-	-	51,910	-
2024	0.0%	72.4%	52,282	-	-	-	52,282	-
2025	0.0%	72.4%	52,655	-	-	-	52,655	-
2026	0.0%	72.4%	52,963	-	-	-	52,963	-

C2. TONNAGE GROWTH PROJECTIONS (BUSINESS AS USUAL)

Year	Diversion Rate (including contamination)	Recoverability of Disposal (disposed curbside recyclables, yard waste, and metals)	Total Tons Generation (excl. source reduction)	Recovery	Beneficial Use	Contamination	Disposed	Source Reduction
Self-Haul Residential				88,060	-	8,353	400,470	-
2016	19.4%	54.6%	43,761	7,755	-	736	35,270	-
2017	19.4%	54.6%	44,053	7,807	-	741	35,505	-
2018	19.4%	54.6%	44,345	7,859	-	745	35,741	-
2019	19.4%	54.6%	44,637	7,911	-	750	35,976	-
2020	19.4%	54.6%	44,930	7,963	-	755	36,212	-
2021	19.4%	54.6%	45,197	8,010	-	760	36,427	-
2022	19.4%	54.6%	45,464	8,057	-	764	36,643	-
2023	19.4%	54.6%	45,731	8,105	-	769	36,858	-
2024	19.4%	54.6%	45,999	8,152	-	773	37,073	-
2025	19.4%	54.6%	46,266	8,199	-	778	37,289	-
2026	19.4%	54.6%	46,499	8,241	-	782	37,477	-
ICI Commercial				2,690,246	-	34,660	3,758,011	-
2016	42.0%	72.5%	580,553	240,915	-	3,104	336,535	-
2017	42.0%	72.5%	582,314	241,645	-	3,113	337,555	-
2018	42.0%	72.5%	584,074	242,376	-	3,123	338,576	-
2019	42.0%	72.5%	585,835	243,107	-	3,132	339,596	-
2020	42.0%	72.5%	587,595	243,837	-	3,141	340,617	-
2021	42.0%	72.5%	589,356	244,568	-	3,151	341,637	-
2022	42.0%	72.5%	591,117	245,298	-	3,160	342,658	-
2023	42.0%	72.5%	592,877	246,029	-	3,170	343,678	-
2024	42.0%	72.5%	594,638	246,760	-	3,179	344,699	-
2025	42.0%	72.5%	596,398	247,490	-	3,189	345,720	-
2026	42.0%	72.5%	598,159	248,221	-	3,198	346,740	-

C2. TONNAGE GROWTH PROJECTIONS (BUSINESS AS USUAL)

Year	Diversion Rate (including contamination)	Recoverability of Disposal (disposed curbside recyclables, yard waste, and metals)	Total Tons Generation (excl. source reduction)					
				Recovery	Beneficial Use	Contamination	Disposed	Source Reduction
Self-Haul ICI				-	-	-	841,356	-
2016	0.0%	60.5%	75,344	-	-	-	75,344	-
2017	0.0%	60.5%	75,573	-	-	-	75,573	-
2018	0.0%	60.5%	75,801	-	-	-	75,801	-
2019	0.0%	60.5%	76,030	-	-	-	76,030	-
2020	0.0%	60.5%	76,258	-	-	-	76,258	-
2021	0.0%	60.5%	76,487	-	-	-	76,487	-
2022	0.0%	60.5%	76,715	-	-	-	76,715	-
2023	0.0%	60.5%	76,944	-	-	-	76,944	-
2024	0.0%	60.5%	77,172	-	-	-	77,172	-
2025	0.0%	60.5%	77,401	-	-	-	77,401	-
2026	0.0%	60.5%	77,629	-	-	-	77,629	-
C&D Debris				-	5,845,427	-	1,405,896	-
2016	80.6%	58.4%	642,987	-	518,324	-	124,663	-
2017	80.6%	58.4%	646,320	-	521,010	-	125,309	-
2018	80.6%	58.4%	649,653	-	523,697	-	125,956	-
2019	80.6%	58.4%	652,986	-	526,384	-	126,602	-
2020	80.6%	58.4%	656,318	-	529,070	-	127,248	-
2021	80.6%	58.4%	659,435	-	531,583	-	127,852	-
2022	80.6%	58.4%	662,551	-	534,095	-	128,456	-
2023	80.6%	58.4%	665,667	-	536,607	-	129,060	-
2024	80.6%	58.4%	668,784	-	539,119	-	129,665	-
2025	80.6%	58.4%	671,900	-	541,631	-	130,269	-
2026	80.6%	58.4%	674,723	-	543,907	-	130,816	-

C3. STRATEGY DIVERSION ASSUMPTIONS

For each strategy, Cascadia used the consultant team’s in-house database and expertise, as well as data from Louisville Metro staff and the Task 1 and Task 2 reports conducted for this project, to develop capture rate estimates. Table 1 presents the diversion inputs by strategy and material type.

Table 1. Participation, Efficiency, and Capture Rate Assumptions for Strategies

Strategy Name	Materials Affected	Participation Rate x	Efficiency Rate =	Capture Rate
Waste reduction and reuse education (residential curbside and self-haul)	R1-Curbside Recycling	20%	5%	1%
	R4-Food and Compostable Paper	20%	5%	1%
	M33-Electronics	20%	5%	1%
	R2-Bulky/textiles/durables	20%	5%	1%
Partnerships with local reuse retailers (residential sector)	R2-Bulky/textiles/durables	5%	20%	1%
Expanded residential marketing program	R1-Curbside Recycling	36%	15%	5%
	M22-Yard Waste	50%	10%	5%
County-wide service level standards (single-family recycling) ¹	R1-Curbside Recycling	50%	80%	40%
Signage standards and adequate infrastructure for multifamily	R1-Curbside Recycling	5%	40%	2%
Multifamily technical assistance	R1-Curbside Recycling	20%	50%	10%
Yard waste disposal ban enforcement (residential, self-haul, ICI, C&D)	M22-Yard Waste	80%	80%	64%

¹ A county-wide service level standard for residential yard waste was previously included as a potential strategy. During the review of model outputs, this bundled strategy—carts, embedded/bundled fees, and standardized bins/labels for residential yard waste—was removed from the short-term scenario because it were determined to be less cost-effective than an alternative proposed strategy: increased enforcement of the existing yard waste disposal ban.

C3. STRATEGY DIVERSION ASSUMPTIONS

Strategy Name	Materials Affected	Participation Rate x	Efficiency Rate =	Capture Rate
Waste reduction and reuse education for businesses (collected and SH)	R1-Curbside Recycling	20%	5%	1%
	R4-Food and Compostable Paper	20%	5%	1%
	R2-Bulky/textiles/durables	20%	5%	1%
	M33-Electronics	20%	5%	1%
Expanded business marketing program	R1-Curbside Recycling	20%	30%	6%
	R4-Food and Compostable Paper	20%	30%	6%
	R3-Yard Waste	20%	30%	6%
Signage standards and adequate infrastructure for businesses	R1-Curbside Recycling	5%	40%	2%
Business technical assistance	R1-Curbside Recycling	5%	65%	3%
	R4-Food and Compostable Paper	5%	50%	3%
Business awards and recognition	R1-Curbside Recycling	3%	15%	0%
	R4-Food and Compostable Paper	3%	15%	0%
	M13-Other Non-ferrous	3%	15%	0%
	M14-Other Ferrous	3%	15%	0%
Partnerships with local reuse retailers (self-haul)	M33-Electronics	20%	50%	10%
	R2-Bulky/textiles/durables	30%	10%	3%
Expanded marketing program for self-haul	R1-Curbside Recycling	10%	20%	2%
	R3-Yard Waste	10%	20%	2%
	R2-Bulky/textiles/durables	10%	20%	2%
	R5-Other Metals	10%	20%	2%
	M25-Wood - Untreated	10%	20%	2%
County-wide service level standards (self-haul)	R1-Curbside Recycling	80%	60%	48%
	R3-Yard Waste	80%	90%	72%
	M25-Wood - Untreated	80%	55%	44%
	R2-Bulky/textiles/durables	80%	55%	44%
	R5-Other Metals	80%	55%	44%

C3. STRATEGY DIVERSION ASSUMPTIONS

Strategy Name	Materials Affected	Participation Rate x	Efficiency Rate =	Capture Rate
Bulky waste processing for Urban Services District	R1-Curbside Recycling	100%	85%	85%
	R2-Bulky/textiles/durables	100%	85%	85%
	R3-Yard Waste	100%	85%	85%
	R6-Everything Else Recoverable	100%	85%	85%
	R5-Other Metals	100%	85%	85%
	R4-Food and Compostable Paper	100%	85%	85%
Self-haul separation requirement	R1-Curbside Recycling	80%	80%	64%
	M25-Wood - Untreated	80%	80%	64%
	R5-Other Metals	80%	80%	64%
	R2-Bulky/textiles/durables	80%	80%	64%
C&D debris waste reduction and reuse education	M25-Wood - Untreated	10%	25%	3%
	M30-Drywall	10%	25%	3%
	M38-Bulky Items/Furniture	10%	25%	3%
	M27-Aggregates	10%	25%	3%
	M24-Wood - Treated	10%	25%	3%
	M26-Remainder/Composite C&D	10%	25%	3%
Expanded C&D debris marketing program	M1-OCC/Kraft	10%	20%	2%
	R1-Curbside Recycling	10%	20%	2%
	R5-Other Metals	10%	20%	2%
	M16-Appliances	10%	20%	2%
	M27-Aggregates	10%	20%	2%
	M28-Asphalt Roofing	10%	20%	2%
	M25-Wood - Untreated	10%	20%	2%
	R3-Yard Waste	10%	20%	2%

C3. STRATEGY DIVERSION ASSUMPTIONS

Strategy Name	Materials Affected	Participation Rate x	Efficiency Rate =	Capture Rate
Promoting green building	M1-OCC/Kraft	1%	3%	0%
	M30-Drywall	1%	3%	0%
	R5-Other Metals	1%	3%	0%
	M24-Wood - Treated	1%	3%	0%
	M27-Aggregates	1%	3%	0%
	M28-Asphalt Roofing	1%	3%	0%
	M25-Wood - Untreated	1%	3%	0%
	M29-Carpet and Carpet Padding	1%	3%	0%
Reuse materials in road construction	M28-Asphalt Roofing	40%	80%	32%
C&D ordinance that requires processing of all C&D materials	M1-OCC/Kraft	80%	90%	72%
	R1-Curbside Recycling	80%	90%	72%
	R5-Other Metals	80%	90%	72%
	M16-Appliances	80%	90%	72%
	M27-Aggregates	80%	90%	72%
	M25-Wood - Untreated	80%	90%	72%

C4. STRATEGY COST ASSUMPTIONS

The consultant team used the following assumptions in developing cost inputs.

C4.1 Cost Units

Louisville Metro Government Labor Costs

Labor costs estimated based on data provided by Louisville Metro staff. Full-time employees (FTE) are estimated to work 1,880 hours per year, assuming approximately 200 hours of combined sick, vacation, and holiday leave. Table 2 presents labor costs used in the model. Plan costs represent new work hours over and above current duties for existing positions.

Table 2. Labor Costs

Labor Category	Fully-Loaded Labor Costs in 2016
Solid Waste Manager (<i>existing position</i>)	\$93,520
Education/Outreach Manager (<i>new: oversees expanded education and outreach activities</i>)	\$81,200
Enforcement Supervisor (<i>existing position</i>)	\$74,200
Education/Outreach Coordinator (<i>existing position</i>)	\$63,700
Education Professional (<i>new: trained education specialist</i>)	\$56,000
Outreach Specialist (<i>new: outreach field staff</i>)	\$53,200
Enforcement Officer (<i>existing position</i>)	\$57,400

Inflation and Discount Rate

Discount rate: 4.09%, based on the rate for the 30-year taxable bond sold by Louisville Metro to Baird & Co. in November 2015.²

Inflation rate: starts at 2.5% in 2016 and rises linearly to 3.5% in 2026.

² "Louisville Metro Earns Strong Bond Ratings" <https://louisvilleky.gov/news/louisville-metro-earns-strong-bond-ratings> (published November 11, 2015)

C4.2 Program Cost Estimates

Education Campaigns

Education and marketing campaigns are estimated to require the following costs:

Design Phase

- 120 to 160 hours per campaign for an education professional, depending on complexity
- \$10,000 for market research, such as focus groups
- \$2,000 for website design/updates (using Louisville Metro's existing website)
- \$2,000 for outreach material/collateral design
- \$2,000 for toolkit design
- \$100,000 per year for the first three years of the residential marketing program for behavior change expert consultants

Implementation Phase

- 80 to 160 hours of time per campaign per year split between Education/Outreach Coordinator, Education Professional, and Outreach Specialist with oversight from Education/Outreach Manager, depending on complexity.
- 20 hours per year per school, reaching 50 schools each year.
- \$0.50 to \$1 per customer for outreach materials
- \$10 per toolkit
- 20 hours per year per school reached
- Additional costs as appropriate for school recycling equipment and collateral, awards ceremonies for recognition programs, and homeowner/resident champion collateral.

New Standards/Contracts and Enforcement

Adopting new standards is estimated to incur the following costs.

- 120 to 960 hours split between the Solid Waste Manager and the Enforcement Supervisor, depending on complexity
- \$15,000 to \$25,000 in attorney fees, depending on complexity

Costs to enforce requirements vary by regulation. Enforcement of the yard waste disposal ban, self-haul separation requirement, and C&D processing ordinance are collectively estimated to require a new half-time FTE for each of five disposal sites, plus oversight by the Enforcement Supervisor. Enforcement of other regulations, such as county-wide service level standards, are estimated to incur between 16 and 32 hours per year per regulation for an Enforcement Office.

Processing of waste collected through "junk and bulk trash" collection three times per year by the Urban Services District is estimated to cost approximately \$30 per ton (Dave Wicking of River Road Shingle Recycling), similar to the current landfill cost of approximately \$30 per ton (Waste Management). The per-ton processing cost is assumed to include any infrastructure costs required to establish processing. Conducting a competitive RFP process to select a processor for USD "junk and bulk trash" is estimated to require 480 hours for the Solid Waste Manager.

Similarly, processing of C&D debris under the C&D ordinance is estimated to cost approximately \$30 per ton (Dave Wicking of River Road Shingle Recycling). The per-ton processing cost is also assumed to include any infrastructure costs required to establish processing. No contracting is required because C&D debris generators will be able to choose any C&D processor that recycles C&D debris.

County-wide Service Level Standards for Single-family Residential Recycling

For this strategy, the plan presents the cost to the County of adopting and enforcing new requirements (described above). Haulers would incur additional costs, which they would pass on to customers. Stated another way, customers who are not currently subscribed to recycling and do not already pay for recycling service would begin to pay for this service under a county-wide standard.

Applying new decals that meet signage standards for **customers who currently have a cart-based recycling service** is estimated to cost \$1.25 to \$3.50 per household as a one-time cost (based on Cascadia's 2013-2015 hauler outreach experience).

Providing carts for **customers who currently have tub-based recycling service** would cost approximately \$0.30 per household per month, based on estimates that carts cost approximately \$50 each and can last 12 to 15 years (based on MSW's experience). One-time delivery of the new carts is estimated to cost \$4 per cart (Recycling Partnership and CD Svcs).

The cost of providing new every-other-week recycling service with a cart for **customers who do not currently have recycling service** will vary depending on whether a customer lives in an incorporated city or in the unincorporated area.

- In the **incorporated cities**, every-other-week recycling service is estimated to cost an average of \$2 per household per month, based on the cost analysis in Volume 2 of this study: *Collection System Assessment*. An estimated 25 percent of household in incorporated cities (excluding the Urban Services District) would have to pay for the new service.
- In the **unincorporated area**, the *Collection System Assessment* found that the cost of recycling varies widely, but a reasonable estimate for every-other-week collection is \$5 per month for those who currently subscribe. An estimated 77 percent of households in the unincorporated area lack curbside recycling collection and would have to pay for the new service.

In unincorporated areas, the costs of adding recycling for customers who do not currently subscribe could be offset by improving collection system efficiency through exclusive, competitive contracts. Based on the research performed in the *Collection System Assessment*, the average household in unincorporated areas currently pays \$18 per month for garbage-only collection in the open market system and might pay only \$11 or \$12 (or less) per month in an exclusive system—a saving of \$6 to \$7 per month. The average cost of every-other-week recycling in an exclusive system in which all customers have recycling is expected to cost about \$2 per month. Therefore, a household that currently receives only garbage service would save \$4 to \$5 per month compared to what they are paying now while receiving new recycling service if the County implemented an exclusive collection system and universal recycling.

Technical Assistance

Technical assistance is estimate to incur the following costs:

- Four to ten hours per business or multifamily property, depending on level of engagement. Hours are split between Education/Outreach Coordinator, Education Professional, and Outreach Specialist with oversight from Education/Outreach Manager
- Outreach materials and toolkit, costing between \$5 and \$10

C5. SCENARIO EVALUATION TONNAGES (BY YEAR AND SECTOR)

The following tables present county-wide tonnages by year and waste stream in the short-term scenario after implementing new strategies.

Year	Diversion Rate (including contamination)	Recoverability of Disposal (disposed curbside recyclables, yard waste, and metals)	Total Tons Generation (excl. source reduction)	Recovery				
				Recovery	Beneficial Use	Contamination	Disposed	Source Reduction
Overall				4,390,298	6,234,025	204,712	8,539,535	32,718
2016	48.7%	67.3%	1,721,017	310,462	518,324	8,883	883,347	-
2017	49.5%	66.8%	1,729,778	325,155	522,559	8,940	873,125	-
2018	51.0%	66.6%	1,737,669	350,145	526,961	20,205	840,359	871
2019	54.5%	64.2%	1,745,609	392,529	547,233	20,353	785,494	1,693
2020	56.5%	62.5%	1,753,628	412,404	566,809	20,501	753,914	2,435
2021	58.0%	61.2%	1,761,185	423,711	585,051	20,636	731,787	3,117
2022	58.1%	61.1%	1,768,738	427,538	587,857	20,772	732,572	3,804
2023	58.3%	60.9%	1,776,287	431,369	590,663	20,908	733,347	4,494
2024	58.5%	60.8%	1,784,057	435,205	593,469	21,043	734,340	4,964
2025	58.6%	60.7%	1,791,825	439,045	596,276	21,179	735,325	5,435
2026	58.8%	60.5%	1,798,774	442,734	598,823	21,293	735,924	5,905

C5. SCENARIO EVALUATION TONNAGES (BY YEAR AND SECTOR)

Year	Diversion Rate (including contamination)	Recoverability of Disposal (disposed curbside recyclables, yard waste, and metals)	Total Tons Generation (excl. source reduction)					
				Recovery	Beneficial Use	Contamination	Disposed	Source Reduction
Single-Family Residential				1,081,820	-	161,699	2,514,423	8,481
2016	20.3%	67.7%	329,215	61,792	-	5,044	262,379	-
2017	22.5%	66.8%	331,953	69,480	-	5,086	257,387	-
2018	27.0%	67.8%	334,495	85,025	-	16,337	233,133	197
2019	29.3%	66.7%	337,042	93,112	-	16,470	227,460	388
2020	31.5%	65.6%	339,594	101,224	-	16,604	221,766	575
2021	33.7%	64.4%	341,908	109,282	-	16,726	215,900	756
2022	33.9%	64.3%	344,219	110,320	-	16,847	217,052	939
2023	34.0%	64.3%	346,528	111,361	-	16,969	218,198	1,124
2024	34.1%	64.2%	348,835	112,405	-	17,091	219,339	1,311
2025	34.3%	64.1%	351,139	113,453	-	17,213	220,474	1,501
2026	34.4%	64.1%	353,015	114,366	-	17,313	221,336	1,691
Multifamily Residential				21,187	-	-	538,997	2,202
2016	0.0%	72.4%	49,157	-	-	-	49,157	-
2017	0.6%	72.2%	49,566	302	-	-	49,264	-
2018	2.0%	71.8%	49,927	972	-	-	48,955	48
2019	2.9%	71.5%	50,287	1,341	-	-	48,946	97
2020	3.7%	71.3%	50,647	1,711	-	-	48,937	145
2021	4.5%	71.1%	50,971	2,079	-	-	48,891	194
2022	5.1%	70.9%	51,294	2,370	-	-	48,924	244
2023	5.7%	70.7%	51,617	2,662	-	-	48,954	293
2024	6.4%	70.5%	51,939	2,956	-	-	48,983	343
2025	7.0%	70.3%	52,261	3,251	-	-	49,010	394
2026	7.6%	70.1%	52,519	3,543	-	-	48,976	444

C5. SCENARIO EVALUATION TONNAGES (BY YEAR AND SECTOR)

Year	Diversion Rate (including contamination)	Recoverability of Disposal (disposed curbside recyclables, yard waste, and metals)	Total Tons Generation (excl. source reduction)					
				Recovery	Beneficial Use	Contamination	Disposed	Source Reduction
Self-Haul Residential				165,171	-	8,353	322,866	492
2016	19.4%	54.6%	43,761	7,755	-	736	35,270	-
2017	22.2%	52.9%	44,053	9,058	-	741	34,254	-
2018	25.2%	51.1%	44,325	10,399	-	745	33,180	20
2019	36.8%	42.1%	44,597	15,611	-	750	28,236	40
2020	40.0%	39.0%	44,881	17,152	-	755	26,974	48
2021	40.0%	39.0%	45,144	17,261	-	760	27,123	53
2022	40.1%	39.0%	45,407	17,371	-	764	27,272	57
2023	40.1%	38.9%	45,670	17,480	-	769	27,421	62
2024	40.1%	38.9%	45,932	17,589	-	773	27,570	66
2025	40.1%	38.9%	46,195	17,699	-	778	27,719	71
2026	40.2%	38.9%	46,424	17,795	-	782	27,847	75
ICI Commercial				2,841,310	-	34,660	3,597,316	9,630
2016	42.0%	72.5%	580,553	240,915	-	3,104	336,535	-
2017	42.7%	72.2%	582,314	245,344	-	3,113	333,856	-
2018	43.7%	71.7%	583,858	251,709	-	3,123	329,027	216
2019	44.1%	71.6%	585,404	254,368	-	3,132	327,904	431
2020	44.4%	71.4%	586,950	257,021	-	3,141	326,788	645
2021	44.8%	71.2%	588,497	259,666	-	3,151	325,680	859
2022	45.1%	71.0%	590,045	261,931	-	3,160	324,954	1,072
2023	45.4%	70.9%	591,593	264,194	-	3,170	324,229	1,284
2024	45.7%	70.7%	593,142	266,458	-	3,179	323,504	1,496
2025	46.0%	70.6%	594,690	268,721	-	3,189	322,781	1,708
2026	46.3%	70.4%	596,240	270,984	-	3,198	322,058	1,919

C5. SCENARIO EVALUATION TONNAGES (BY YEAR AND SECTOR)

Year	Diversion Rate (including contamination)	Recoverability of Disposal (disposed curbside recyclables, yard waste, and metals)	Total Tons Generation (excl. source reduction)	Total Tons				
				Recovery	Beneficial Use	Contamination	Disposed	Source Reduction
Self-Haul ICI				277,772	-	-	562,901	684
2016	0.0%	60.5%	75,344	-	-	-	75,344	-
2017	1.1%	60.0%	75,573	814	-	-	74,759	-
2018	2.3%	59.5%	75,773	1,726	-	-	74,047	29
2019	36.6%	37.6%	75,973	27,782	-	-	48,190	57
2020	46.0%	26.9%	76,190	34,980	-	-	41,211	68
2021	46.0%	26.8%	76,413	35,103	-	-	41,310	74
2022	46.1%	26.8%	76,636	35,226	-	-	41,410	80
2023	46.1%	26.7%	76,859	35,350	-	-	41,509	85
2024	46.1%	26.7%	77,081	35,473	-	-	41,608	91
2025	46.2%	26.6%	77,304	35,597	-	-	41,707	97
2026	46.2%	26.6%	77,526	35,721	-	-	41,806	103
C&D Debris				3,038	6,234,025	-	1,003,031	11,229
2016	80.6%	58.4%	642,987	-	518,324	-	124,663	-
2017	80.9%	57.9%	646,320	156	522,559	-	123,605	-
2018	81.3%	57.2%	649,291	314	526,961	-	122,016	361
2019	84.0%	50.1%	652,306	316	547,233	-	104,758	679
2020	86.7%	40.6%	655,365	317	566,809	-	88,239	953
2021	89.1%	28.0%	658,253	319	585,051	-	72,883	1,182
2022	89.2%	27.9%	661,138	320	587,857	-	72,961	1,413
2023	89.2%	27.9%	664,021	322	590,663	-	73,036	1,646
2024	89.3%	27.8%	667,128	323	593,469	-	73,336	1,656
2025	89.3%	27.8%	670,235	325	596,276	-	73,634	1,665
2026	89.3%	27.8%	673,050	326	598,823	-	73,901	1,673

C6. SCENARIO EVALUATION COSTS (BY YEAR)

The first table below presents the additional costs the County would incur to implement all of the strategies recommended in ten-year solid waste plan by year from 2017 through 2026. The second table presents the anticipated additional staffing requirements to implement strategies. Staffing requirements are presented as additional full-time equivalent (FTE) employees by position type.

These costs and staffing requirements are in addition to current activities. For example, in 2017 the existing solid waste manager is anticipated to have an additional 480 hours of work (equivalent to 0.3 FTE) to implement the plan in addition to his current full-time workload (assumed to be 1.0 FTE), requiring hiring or other staffing adjustments. Labor costs for these additional staffing needs are included in total scenario costs.

Year	Total Scenario Costs			Total (2016 \$)
	Capital Expenditures	Labor Expenditures	Operational Expenditures	
2017	\$ 15,771	\$ 630,349	\$ 338,099	\$ 984,219
2018	\$ 145,878	\$ 577,227	\$ 472,273	\$ 1,195,378
2019	\$ 33,616	\$ 483,906	\$ 374,450	\$ 891,972
2020	\$ -	\$ 411,276	\$ 263,109	\$ 674,385
2021	\$ -	\$ 412,514	\$ 227,623	\$ 640,137
2022	\$ -	\$ 408,891	\$ 226,540	\$ 635,431
2023	\$ -	\$ 401,671	\$ 212,759	\$ 614,430
2024	\$ -	\$ 395,044	\$ 212,209	\$ 607,253
2025	\$ -	\$ 393,088	\$ 211,860	\$ 604,949
2026	\$ -	\$ 391,501	\$ 211,584	\$ 603,085
Total	\$ 195,266	\$ 4,505,467	\$ 2,750,505	\$ 7,451,238

C6. SCENARIO EVALUATION COSTS (BY YEAR)

Year	Total Full-time Equivalent Employees (labor costs included in scenario costs)							Total FTE
	Solid Waste Manager	Education/ Outreach Manager	Enforcement Supervisor	Education/ Outreach Coordinator	Education Professional	Outreach Specialist	Enforcement Officer	
2017	0.3	0.2	0.1	1.5	4.3	3.4	1.3	11.1
2018	0.9	0.2	0.6	1.2	2.4	2.2	2.0	9.6
2019	0.1	0.2	0.1	1.1	2.2	2.2	2.7	8.7
2020	-	0.2	0.1	0.9	2.1	2.2	2.0	7.6
2021	-	0.2	0.1	0.9	2.2	2.3	2.0	7.7
2022	-	0.2	0.1	0.9	2.2	2.3	2.0	7.7
2023	-	0.2	0.1	0.9	2.1	2.3	2.0	7.6
2024	-	0.2	0.1	0.9	2.1	2.2	2.0	7.5
2025	-	0.2	0.1	0.9	2.1	2.2	2.0	7.5
2026	-	0.2	0.1	0.9	2.1	2.3	2.0	7.6
Total	1.3	1.9	1.4	9.9	24.1	23.7	20.2	82.5