INTRODUCTION

In 1991, Beaver County adopted its first Municipal Solid Waste Management Plan under the provisions of the Municipal Waste Planning, Recycling and Waste Reduction Act of 1988 (Act 101). Act 101 was the first piece of legislation to transfer the powers and responsibilities for waste management planning to the counties. It also offered counties the ability to delegate those powers and responsibilities to a specific agent, department, or agency. The first update to Beaver County's 1991 Plan was initiated in 2000 and approved and adopted in 2004. The next update and revision to the Plan launched in 2010 and culminated with approval in 2015. These revisions solidified the County's waste flow control policies and dedication to an integrated waste management system.

The focus of county level planning under Act 101 is to assure enough disposal capacity exists to handle the municipal waste generated locally. Under the proper circumstances, counties may control the flow of waste for disposal to designated facilities. Counties may enter into contractual agreements and enact ordinances to facilitate the implementation of these and other related policies and programs developed under solid waste management plans. Other activities and programs implemented at the county level are strictly voluntary under the law.

Despite granting counties greater statutory authority than in the past, Act 101 did not absolve municipalities of the duty to ensure local residents and businesses have access to and utilize proper, convenient, and affordable waste management services. Act 101 and PA Municipal Code still largely reserve certain storage, collection, transportation, and recycling responsibilities for the municipalities. Developing universal access to waste and recycling collection remains challenging from a county planning perspective. Success depends largely on the willingness and cooperation of local municipal officials and the acceptance of Beaver County citizens.

The Plan acknowledges the intergovernmental cooperation and private sector investments, which form the foundation of the waste, recycling and composting infrastructure within the County. It documents previous success and paves the way for future innovative programs.

CURRENT INITIATIVES

This project represents the first major overhaul of the Plan's physical document since approval of the 2015 version. The structure and format of the Plan have been revamped to comply with the current *Technical Guidance Document 254-2212-504* issued by the Pennsylvania Department of Environmental Protection (PADEP) and published in the Pennsylvania Bulletin on January 2, 2010. These *Guidelines for the Development of*

County Municipal Waste Management Plan Revisions serve to clarify not only the provisions of Act 101, but also a host of court rulings and legal references related to the statutory authority granted to counties for municipal solid waste planning and implementation. For the most part, the legal issues deal with the procurement of disposal and processing capacity, along with flow control mandates that may result from that process.

The 2025 Plan Update adheres to the basic chapter order and subject matter dictated by Act 101 and reinforced by the guidance document. It also has a more user-friendly appearance. These physical changes may raise concerns that the Plan's principles are somehow radically different. However, any programmatic or policy modifications made to the Plan are minor in scope. Therefore, from a regulatory perspective, this update is considered non-substantial and does not require ratification by the municipalities.

ACCOMPLISHMENTS FROM PREVIOUS PLANNING EFFORTS

Without doubt, Beaver County has built and grown an extensive infrastructure to accommodate the waste, recycling, and composting management needs in the County. From providing recycling opportunities in under-serviced areas to operating a functional composting facility and providing outlets for hard to manage materials like Household Hazardous Waste and Electronic Discards, the County has voluntarily exceeded its obligations. These programs and services complement those resulting from private sector investments and municipal programs.

This 2025 version of the Beaver County Municipal Solid Waste Management Plan evaluates the effectiveness of the original 1991 Plan and its subsequent updates and revisions. The planning process was launched with the Solid Waste Advisory Committee discussing if and how the County and municipalities succeeded in attaining these formerly proposed actions. Additionally, the Committee expressed opinions for which of the programs continued to be of value to the municipalities and residents.

The 2025 planning process also examined Beaver County's ability to implement the Plan's original and revised tenets. Based on those findings, certain components have been adjusted, and programs have been altered to complement the current demographics, economy, and resources of Beaver County. None of the changes constitute a diversion from the fundamental policies and services. Recommendations moving forward retain the existing philosophy of relying on public/private partnerships.

Figure 0-1 shows a list of goals from then 2015 Plan are given renewed attention in the 2025 version. These items are discussed throughout the Plan. The 2025 Plan offers some new approaches to help promote and execute these actions. A final determination for pursuing these and potentially other goals is provided in Chapter 5.

FIGURE 0-1 PROGRAM GOALSFROM 2015 RECONSIDERED IN THE BEAVER COUNTY 2025 MUNICIPAL SOLID WASTE MANAGEMENT PLAN

	Encourage municipalities to enact ordinances for proper waste management
	Support municipalities seeking collection services through improved contracting proedures and specifications
	Expand the recycling drop-off collection sites
	Support the development of services to facilitate a food waste collection program
	Increase the number of HHW & E-Waste collections
	Evaluate the effectiveness of registering haulers and transfer stations to determine if reporting has improved
	Facilitate a greater number of illegal dump clean-ups
	Update the means, methods, content and materials to conduct effec tive educational outreach on a variety of topics
	Target multiple platforms to expand social media presence
	Provide Technical Assistance to Municipalities
	Develop a system to expand recycling collection at community events
	Conduct an enducational campaign focused on waste minimization strategies and practices

MONETARY AND ENVIRONMENTAL BENEFITS OF IMPLEMENTING THE PLAN

Beaver County has continued to implement the Plan and its updates successfully. The rewards for these efforts are an abundance of accomplishments. Most notably, by securing disposal capacity in publicly owned landfills dedicated to local needs, the County ensured its citizens fair and equitable disposal costs. These professionally operated state of the art facilities decreased Beaver County's future potential environmental liabilities. By recovering methane gas generated by the decomposition of disposed waste, the designated landfills provide a renewable energy source while controlling greenhouse gas emissions. Producing energy from waste in the form of methane recovery is considered a legitimate alternative to fossil fuels by the United States Environmental Protection Agency (USEPA).

Active campaigns to collect hard to manage materials have reduced the occurrence of illegal dumping in the County, thus enhancing public health and safety and protecting property values.

Throughout Beaver County, public and private sector initiatives have fostered the growth of recycling opportunities and programs. Until recently, the environmental effects of recycling have been difficult to measure and quantify. Because the impact of these benefits is not immediate and direct to the recycler, the gains are often overlooked. Whether mandated or voluntary, the recovery of recyclable material results in the conservation of valuable natural resources. Acknowledging the positive effect local recycling efforts have on conserving natural resources and energy production is of great importance.

Figure 0-2 shows some of the environmental benefits of recycling in Beaver County for 2023 based on the Waste Reduction Model (WARM), a tool created by the USEPA to track and evaluate greenhouse gas (GHG) emissions reductions. WARM can be used to assess the performance of a variety of waste management practices. Here the model calculates energy units (million BTU) based on material types commonly found in municipal solid waste collection programs. It doesn't include materials recycled by industries. The majority of Beaver County communities collect residential corrugated cardboard, paper, glass, aluminum, bimetal, and plastics as one mix, or a single stream. Commercial establishments and local drop-off programs may collect these materials separately. Both the mixed and individual weights where available were used for this exercise.

FIGURE 0-2 EQUIVALENT RESOURCES CONSERVED BY RECYCLING IN BEAVER COUNTY 2023

ACTIVITIES FEATURED IN THE PLANNING EFFORTS

The Beaver County Municipal Solid Waste Management Plan is the culmination of a series of activities. The planning process is designed to examine existing facts, statistics, and circumstances to project future needs and to determine how to accommodate for them. In solid waste planning, these activities traditionally include:

Waste Characterization

One of the first steps in planning for municipal solid waste management is to identify and understand the sources, types, and quantities of generated waste. Since waste

generation is typically measured in terms which relate to population and other socio-economic factors, examining local demographic trends is important. National and regional studies and trends are used to analyze the local reported data and to establish benchmarks.

Available Services and Utilization

Examining municipal solid waste collection programs for residential, commercial, institutional, and government entities can reveal where adequate access to services exists as well as where there are service gaps and inadequacies. Identifying service providers for collection, processing, and disposal along with tracking the utilization of those services by local citizens is a good step in revealing where poor waste management habits may exist. It is also valuable to explore services that could be made available based on new technologies or new operations.

Potential for Recovery and Diversion

An intense review of reported recycling and waste diversion activities serves as a foundation to determine future projected recovery of materials. It also establishes the potential for future business development opportunities. Creating a baseline allows for the development of performance objectives and metrics.

Implementation Strategy

The final component brings the planning process's findings and recommendations together in an action plan. The action plan clearly defines the resources, tools, and timeframe necessary to achieve the goals of a municipal waste management plan.

All of these elements are organized and arranged in a structure called the implementation plan. It serves as the final documentation of the process and as a guide for future requirements.

SUMMARY

The 2025 Plan outlines the stepwise process from fact finding through analysis to final recommendations. To facilitate implementation, the Plan includes a table of recommendations and a timeline for expected implementation of each facet. Some actions are suggested for immediate needs, while others, which require additional efforts and resources, will be introduced in transitional phases and as funds permit.

CHAPTER ONE

Local Municipal Waste Quantities and Composition

Chapter 1 provides a brief outline of Beaver County and its municipalities. It discusses physical, social, economic and governmental characteristics. Commentary explains how general demographic features can influence municipal waste management. The types of municipal waste are described along with the sources and activities where those wastes are generated in Beaver County.

EVIDENCE BASED DECISION MAKING

The development of a municipal solid waste management plan is first and foremost reliant on good data. Also critical is the knowledge and experience to interpret the data. The overall planning process comes with the expectation that certain industry standards and assumptions will be utilized to determine the programs and services appropriate for local conditions. While those basic skills and tools are important, conducting research beyond the recorded waste disposal and recovery figures offers planners and program managers a better perspective on how and why certain policies may fail or thrive. Data sources on economic conditions, history, heritage, the people, and their environment are vital in understanding local practices. Local data can point to unique circumstances or materials, which may not fit into the typical trends and solutions and therefore, may require special attention. Knowledge of lifestyles, education, housing, employment, and population also offers insight into the ease or difficulty in implementing potential changes.

Much of the data utilized throughout the Plan is derived from familiar sources. Demographic information is provided from research and publications issued by the US Census Bureau along with the Pennsylvania State Data Center. Information regarding reported tonnages of disposed waste is supported by data reported to PADEP and maintained in their data base. Beaver County also receives reports directly from in and out-of-state disposal facilities and transporters. This information is used to supplement the Department's data. For recycling and composting, the Beaver County Department of Sustainability and Waste Management tracks and monitors these activities. The Recycling Coordinator enters the local data into PADEP's ReTrac database, which is used as the source for recycling and composting tonnages in the Plan. For benchmarking and performance purposes the local information is

compared to national disposal and recovery averages compiled by USEPA. The national data serves as a useful comparative analysis to spot anomalies, identify strengths, target weaknesses, and build better business plans.

In many instances, independent studies, industry best practices and assumptions, familiarity and first-hand experience with state and local industry operations and trends are necessary to rely upon to interpret and explain the raw data.

AN OVERVIEW OF BEAVER COUNTY

Beaver County is considered part of Appalachia, or more accurately the Appalachian Region. It isn't culturally identical to the traditional area known as Appalachia, nor is it physically within the Appalachian Mountains, colloquially referred to as the Allegheny Mountain Range. However, Beaver County shares other characteristics which are similar to the socio-economic conditions found in the other 423 counties across 13 states which make up the Appalachian Region Commission.

FIGURE 1-1 THE APPALACHIAN REGION

Beaver County was initially considered part of the Region due in part to the collapse of the steel industry and its lingering effects. What's currently distinctive about the County is while it was considered a distressed county at that time, it is successfully transitioning out of that status due to new job opportunities and investments.

An important part of elevating local perspectives about a county's status is to ensure that responsible waste management practices are reinforced and that services to support those behaviors are widely available. The absence of illegal dumping and littering reduce blight and enhance property values. Figure 1-1 shows the area which comprises the Appalachian region

GEOGRAPHY AND PHYSICAL CHARACTERISTICS

Beaver County Pennsylvania is located in the Greater Pittsburgh area of southwest Pennsylvania. The county borders Lawrence County on the north, Butler County on the east, Allegheny County on the southeast, Washington County on the south, and to the

west, Hancock County in West Virginia, and Columbiana County in Ohio. A number of major roads and highways provide access to the County and its municipalities. These include the Pennsylvania Turnpike I-76 and I-376, which are part of the Interstate Highway system and the Lincoln Highway, US 30. Important state roadways include PA Routes 18, 65, 51, and 68.

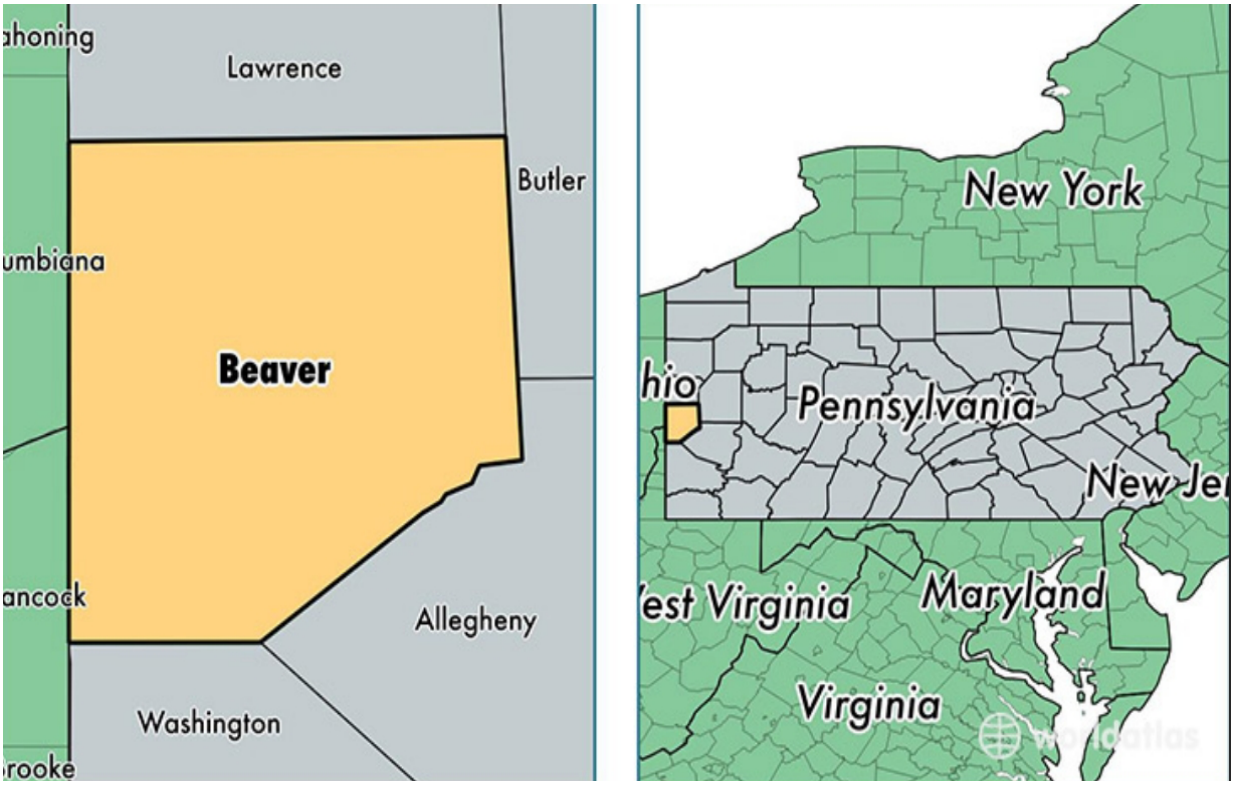
With a land area of 435 square miles, Beaver County is not among the largest counties in Pennsylvania based on physical size. While there are some rural areas in the County, it is primarily considered urban based on population and housing density.

In addition to land, Beaver County also has another 9.3 square miles of water area. As the tagline in the County's logo suggests, rivers are dominant, not only as physical features, but in their contribution to the past industrial heritage. Many of the bridges which crossed these rivers have become cultural icons connecting communities of families and friends, as well as supporting major industries with a reliable workforce.

The Ohio River divides the southern third of the county from the northern two-thirds. Starting at a point near Ambridge, the Ohio flows north then shifts to the west near the town of Beaver, the county seat, before it proceeds into Ohio and West Virginia. From Lawrence County, near Koppel the Beaver River flows south into the Ohio near Beaver. Formed by the confluence of the Allegheny and Monongahela Rivers, the Ohio River as an avenue for commerce might very well be the lynchpin which ties the Beaver Valley to the broad region commonly recognized as the Steel City.

Figure 1-2 shows Beaver County in relationship to the surrounding Pennsylvania , Ohio, and West Virginia counties.

FIGURE 1-2 MAP OF BEAVER COUNTY AND PENNSYLVANIA



GOVERNING ROLES AND CHARACTERISTICS

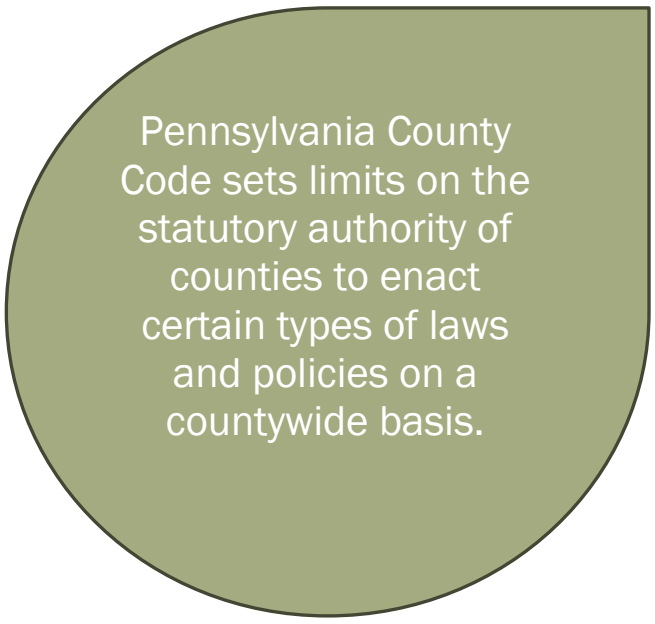
Beaver County is governed under the leadership of an elected three-member Board of Commissioners. Directors of various departments serve in supporting roles. Pennsylvania counties are assigned to one of nine classifications based on population. The system was created by state law in 1953 for the purpose of legislating and regulating county affairs. Beaver County is considered a Fourth Class County because its estimated 2022 population (167,629 ACS 5yr.) ranges between 145,000 to 209,000 people. Nearby counties which also are considered Fourth Class include Butler, Fayette, and Cambria. In comparison, Allegheny County is considered Second Class with a population between 1 to 1.5 million. On the opposite spectrum, Lawrence County qualifies as a Fifth Class County with a population of 90,000 to 144, 999.

While Pennsylvania's county classification codes consider the similarity in each county's population, the Office of Business Management (OMB) assigns continuum codes which encompass a broader region than a single county. These are considered metropolitan areas or non-metropolitan areas which are adjacent to metropolitan areas and those which are not adjacent to metropolitan areas. The codes are updated every ten years. Beaver County is included in the Pittsburgh Metropolitan Area, which considered

Continuum Code 1 with a population exceeding 1 million people. The Continuum Codes consider more than just population. Items such as the labor market and how the economies of adjacent counties may be reliant on one another. In that regard it is easier to consider the similarities between Beaver County and local counties which are not Fourth Class. Other local counties within the Pittsburgh Metropolitan Area include Allegheny, Armstrong, Butler, Fayette, Lawrence, Washington, and Westmoreland. Both the County Codes and the Continuum Codes can be useful when attempting to benchmark local waste management and recovery performance or the feasibility of services to a similar demographic.

TYPES AND CHARACTERISTICS OF MUNICIPALITIES

A combination of cities, boroughs and townships, each with local governing bodies of councils or boards of supervisors, comprise the fifty-three local municipal governments. These include twenty-nine boroughs, five 1st Class townships , seventeen 2nd Class townships, and two 3rd Class cities.



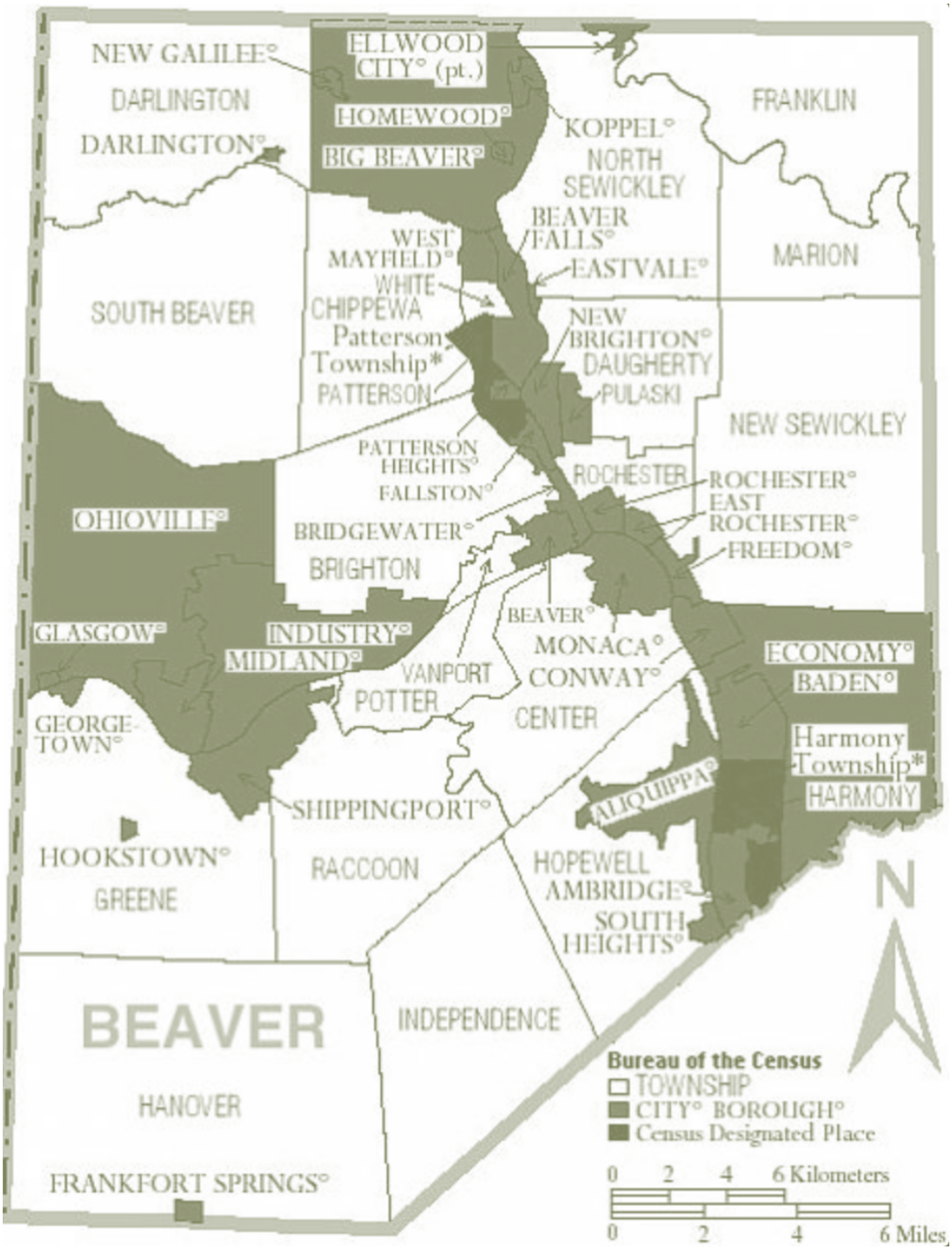
Unlike many states in which counties represent the lowest form of local government, Pennsylvania is a Commonwealth, which recognizes the autonomy of local municipalities. In fact, Pennsylvania County Code sets limits on the statutory authority of counties to enact certain types of laws and policies on a countywide basis. Municipalities have a much broader scope of power. Formal approval and ratification by local municipal bodies is often required for specific plans and policies that impact the entire county. This also gives municipalities a much stronger voice with state legislators when new laws are considered.

Services like waste management are among those traditionally considered the domain of local government. In a precedent setting move, Act 101 shifted responsibility for comprehensive municipal waste management planning from the municipalities to the counties, particularly for disposal needs. Understanding how and why waste and recycling services are similar and where they differentiate is vital to that planning process. Act 101 recognizes the importance of municipal input and requires the appointment of one representative from each class of municipality to participate in the development of county municipal waste management plans. During the planning process for the Beaver County Municipal Solid Waste

Management Plan, the feedback from municipal government representatives helped to clarify and prioritize a number of issues.

Figure 1-3 shows the types and boundaries of the municipalities within Beaver County.

FIGURE 1-3 MAP OF BEAVER COUNTY MUNICIPALITIES



LOCAL FACTORS THAT IMPACT WASTE MANAGEMENT DECISIONS

Although Beaver County is considered part of the Pittsburgh Metropolitan Region, portions of the County are rural and agricultural in nature. Interestingly, the highest percentage of population in the County, more than 70 percent, From my perspective, you're taking away a valuable resides on the smallest land area. Conversely, approximately only 27 percent of the County's population lives on approximately 73 percent of the land. The differences in population and housing densities between the urban and rural portions of the County are significant.

Table 1-1 shows the population and housing units dispersed throughout the County delineated by urban and rural classifications.

TABLE 1-1 BEAVER COUNTYWIDE URBAN AND RURAL DISTRIBUTION OF POPULATION

	Percent of population	Percent of Housing Units	Land Area Square Miles	Percent of Land Area	Population Density per Square Mile	Housing Density per Square Mile
Urban	71.08%	72.80%	85.20	19.60%	1,403.32	674.57
Rural	28.92%	27.20%	349.49	80.40%	139.20	61.43

Population and housing density are key factors in determining the types and methods of waste and recycling collection services for an area. Table 1-2 lists the municipalities, whether they are considered urban or rural, the form of local government, the 2022 estimated population, and the population density.

TABLE 1-2 POPULATION AND DENSITY BY MUNICIPALITY

	Rural/Urban Status	**Estimated Population 2022**	Square Land Miles	Population per Square Land Mile,
Aliquippa City	Urban	9198	4.2	2,192.0
Ambridge Borough	Urban	6937	1.5	4,664.4
Baden Borough	Urban	3891	2.3	1,721.2
Beaver Borough	Urban	4407	0.9	4,811.9
Beaver Falls City	Urban	8934	2.1	4,183.6
Big Beaver Borough	Rural	1796	17.8	100.9
Bridgewater Borough	Urban	788	0.6	1,265.4
Brighton Township	Urban	8754	19.4	451.4
Center Township	Urban	11678	15.0	776.0
Chippewa Township	Urban	7985	15.7	509.0
Conway Borough	Urban	2105	1.3	1,649.3
Darlington Borough	Urban	244	0.1	2,989.4
Darlington Township	Rural	1868	22.0	85.0
Daugherty Township	Urban	3065	9.9	310.0
East Rochester Borough	Urban	534	0.4	1,459.7
Eastvale Borough	Urban	177	0.1	1,957.0
Economy Borough	Urban	9063	17.9	507.1
Ellwood City Borough		696		

	Rural/Urban Status	**Estimated Population 2022**	Square Land Miles	Population per Square Land Mile,
Fallston Borough	Urban	211	0.5	445.1
Frankfort Springs Borough	Urban	156	0.3	599.7
Franklin Township	Rural	3870	17.7	218.8
Freedom Borough	Urban	1625	0.6	2,691.1
Georgetown Borough	Urban	211	0.2	1,206.1
Glasgow Borough	Urban	69	0.1	1,152.9
Greene Township	Rural	2099	25.0	83.9
Hanover Township	Rural	3351	44.9	74.7
Harmony Township	Urban	3178	2.9	1,092.5
Homewood Borough	Urban	96	0.2	566.6
Hookstown Borough	Urban	93	0.1	687.1
Hopewell Township	Urban	13413	16.8	800.1
Independence Township	Rural	2208	23.2	95.3
Industry Borough	Rural	1678	10.1	165.6
Koppel Borough	Urban	743	0.5	1,382.7
Marion Township	Rural	703	10.2	68.6
Midland Borough	Urban	2658	1.8	1,469.3
Monaca Borough	Urban	5587	2.0	2,756.2
New Brighton Borough	Urban	5645	1.0	5,471.1

	Rural/Urban Status	**Estimated Population 2022**	Square Land Miles	Population per Square Land Mile,
New Galilee Borough	Urban	334	0.3	1,207.5
New Sewickley Township	Rural	7157	32.7	218.9
North Sewickley Township	Rural	5479	20.8	263.8
Ohioville Borough	Rural	3344	23.3	143.3
Patterson Township	Urban	3111	1.7	1,880.7
Patterson Heights Borough	Urban	686	0.2	3,042.4
Potter Township	Rural	537	6.5	83.1
Pulaski Township	Urban	1221	0.7	1,679.6
Raccoon Township	Rural	2790	18.7	149.0
Rochester Borough	Urban	3460	0.6	5,883.5
Rochester Township	Urban	2766	3.9	712.0
Shippingport Borough	Rural	223	3.4	64.8
South Beaver Township	Rural	2669	29.7	89.9
South Heights Borough	Urban	333	0.3	1,019.0
Vanport Township	Urban	1372	0.9	1,499.9
West Mayfield Borough	Urban	1270	0.8	1,597.5
White Township	Urban	1163	0.7	1,678.3

In addition to density, the types of structures and layouts of the streets and alleyways often dictate the types of vehicles and equipment that can be utilized. For instance, single family detached homes, row houses, and to some degree small apartment buildings with four or less units can be serviced at the curb. Larger multi-family dwellings typically require large container (dumpster) service. Beaver County has primarily single family detached homes which easily facilitate curbside collection of waste and recycling. It is important to understand how these differ from municipality to municipality. Time, distance, and labor all affect the cost of collecting and transporting materials for disposal and/or processing.

Table 1-3 shows the municipalities and the types housing units and the percentage of each.

TABLE 1-3 HOUSING TRENDS BY MUNICIPALITY 2022

Municipality	Occupied Housing Units	Single Family Home (1 Unit Detached)	Townhouse, Rowhouse, etc. (1 Unit Attached)	Small Apartment Building (2 to 9 Units),	Large Apartment Building (10+ Units)	Mobile Home and Other
Aliquippa City	4,561	64.3%	11.6%	16.5%	6.7%	0.8%
Ambridge Borough	3,124	59.7%	7.2%	27.7%	5.2%	0.2%
Baden Borough	1,708	77.4%	3.7%	11.3%	7.3%	0.4%
Beaver Borough	2,085	62.3%	5.0%	18.1%	14.5%	0.0%
Beaver Falls City	3,483	57.3%	7.0%	24.6%	11.0%	0.1%
Big Beaver Borough	745	84.8%	2.0%	0.0%	0.0%	13.2%
Bridgewater Borough	407	60.3%	4.3%	19.2%	15.8%	0.4%
Brighton Township	3,293	92.1%	2.8%	1.9%	2.9%	0.3%
Center Township	4,815	82.2%	5.1%	4.2%	4.8%	3.7%
Chippewa Township	3,301	79.2%	6.3%	11.5%	2.7%	0.3%
Conway Borough	1,087	75.6%	0.4%	9.0%	14.1%	0.9%
Darlington Borough	84	63.3%	0.0%	30.0%	2.2%	4.4%
Darlington Township	790	81.7%	1.4%	0.0%	0.0%	16.9%
Daugherty Township	1,301	93.5%	5.3%	0.0%	0.0%	1.2%
East Rochester Borough	267	41.3%	17.0%	40.9%	0.7%	0.0%
Eastvale Borough	68	93.4%	0.0%	5.5%	0.0%	1.1%

Municipality	Occupied Housing Units	Single Family Home (1 Unit Detached)	Townhouse, Rowhouse, etc. (1 Unit Attached)	Small Apartment Building (2 to 9 Units),	Large Apartment Building (10+ Units)	Mobile Home and Other
Economy Borough	3,809	92.0%	3.5%	0.0%	0.0%	4.6%
Ellwood City Borough						
Fallston Borough	103	82.9%	0.0%	7.2%	0.0%	9.9%
Frankfort Springs Borough	48	90.6%	0.0%	0.0%	0.0%	9.4%
Franklin Township	1,620	81.2%	3.8%	2.1%	9.7%	3.1%
Freedom Borough	638	83.4%	2.3%	9.3%	3.2%	1.8%
Georgetown Borough	71	94.8%	2.6%	0.0%	0.0%	2.6%
Glasgow Borough	26	73.0%	0.0%	0.0%	0.0%	27.0%
Greene Township	841	82.9%	1.4%	0.0%	0.0%	15.7%
Hanover Township	1,186	81.3%	2.2%	0.0%	0.0%	16.6%
Harmony Township	1,415	95.0%	0.0%	5.0%	0.0%	0.0%
Homewood Borough	47	96.1%	0.0%	3.9%	0.0%	0.0%
Hookstown Borough	59	81.5%	0.0%	0.0%	0.0%	18.5%
Hopewell Township	5,699	79.5%	8.0%	2.2%	8.1%	2.2%
Independence Township	933	78.0%	0.0%	1.8%	0.0%	20.1%
Industry Borough	681	90.4%	0.3%	5.5%	0.4%	3.4%
Koppel Borough	320	83.5%	4.3%	11.4%	0.0%	0.9%
Marion Township	315	82.4%	1.2%	8.1%	0.0%	8.4%
Midland Borough	1,100	42.6%	15.6%	33.2%	5.6%	2.9%
Monaca Borough	2,449	75.3%	2.7%	13.0%	9.0%	0.0%
New Brighton Borough	2,795	54.2%	2.0%	23.4%	20.0%	0.4%
New Galilee Borough	145	80.8%	3.0%	4.2%	0.0%	12.0%

Municipality	Occupied Housing Units	Single Family Home (1 Unit Detached)	Townhouse, Rowhouse, etc. (1 Unit Attached)	Small Apartment Building (2 to 9 Units),	Large Apartment Building (10+ Units)	Mobile Home and Other
New Sewickley Township	3,126	70.0%	14.7%	3.1%	0.0%	12.2%
North Sewickley Township	2,169	92.6%	0.0%	1.2%	0.0%	6.1%
Ohioville Borough	1,273	86.5%	2.3%	4.4%	0.0%	6.8%
Patterson Township	1,252	76.1%	5.9%	4.7%	13.3%	0.0%
Patterson Heights Borough	275	95.8%	3.1%	0.3%	0.7%	0.0%
Potter Township	214	85.0%	7.5%	1.3%	0.0%	6.2%
Pulaski Township	668	71.7%	4.3%	14.0%	2.4%	7.7%
Raccoon Township	1,069	85.3%	0.0%	2.2%	1.3%	11.3%
Rochester Borough	1,563	57.0%	2.8%	16.6%	23.6%	0.0%
Rochester Township	1,115	87.6%	0.6%	10.1%	1.7%	0.0%
Shippingport Borough	99	85.3%	0.0%	0.0%	0.0%	14.7%
South Beaver Township	1,107	72.3%	4.9%	1.0%	0.0%	21.8%
South Heights Borough	169	72.5%	2.8%	15.6%	0.0%	9.2%
Vanport Township	723	27.4%	21.8%	47.3%	3.6%	0.0%
West Mayfield Borough	549	86.1%	3.1%	9.3%	0.0%	1.5%
White Township	603	56.1%	5.0%	20.8%	18.1%	0.0%

IMPORTANCE AND INFLUENCE OF LOCAL POLICIES AND PRACTICES

Municipal officials have a responsibility to encourage greater participation in sound waste management practices. One way to accomplish this is to ensure that residents have the lowest cost available for the level of services desired. Policies that allow for voluntary subscription to secure collection services typically have higher per home pricing than waste and recycling services secured via a competitive bidding process. For communities that already enter contractual agreements for these services, costs may be lowered by modernizing the bid specifications, partnering in joint municipal collection contracts, and being realistic with their expectations for material recovery. Sharing the risk of the recycling commodities market by using a fair and equitable formula is another way to control overall costs.

Technically, where waste is collected at the curb or side of the road, recycling can be collected in the same manner. The cost to do so however differs from one community to another. Clusters of population are easier and less expensive to access and service than those which are spread over wider geographic areas. Single family detached homes are more conducive to curbside collection than are multi-family dwellings where there may be multiple floors of attached units with no direct outside entrance.

Where single family housing units are densely clustered in one community, or when a greater number of units are guaranteed to participate from joint municipal programs, the result is lower costs. Because the fixed costs of providing service can be distributed among a greater number of units, homeowners experience lower service rates than if each were to negotiate for the same level of service on their own.

Figure 1-4 illustrates the curbside collection potential for Beaver County communities with population density greater than 200 people per square mile.

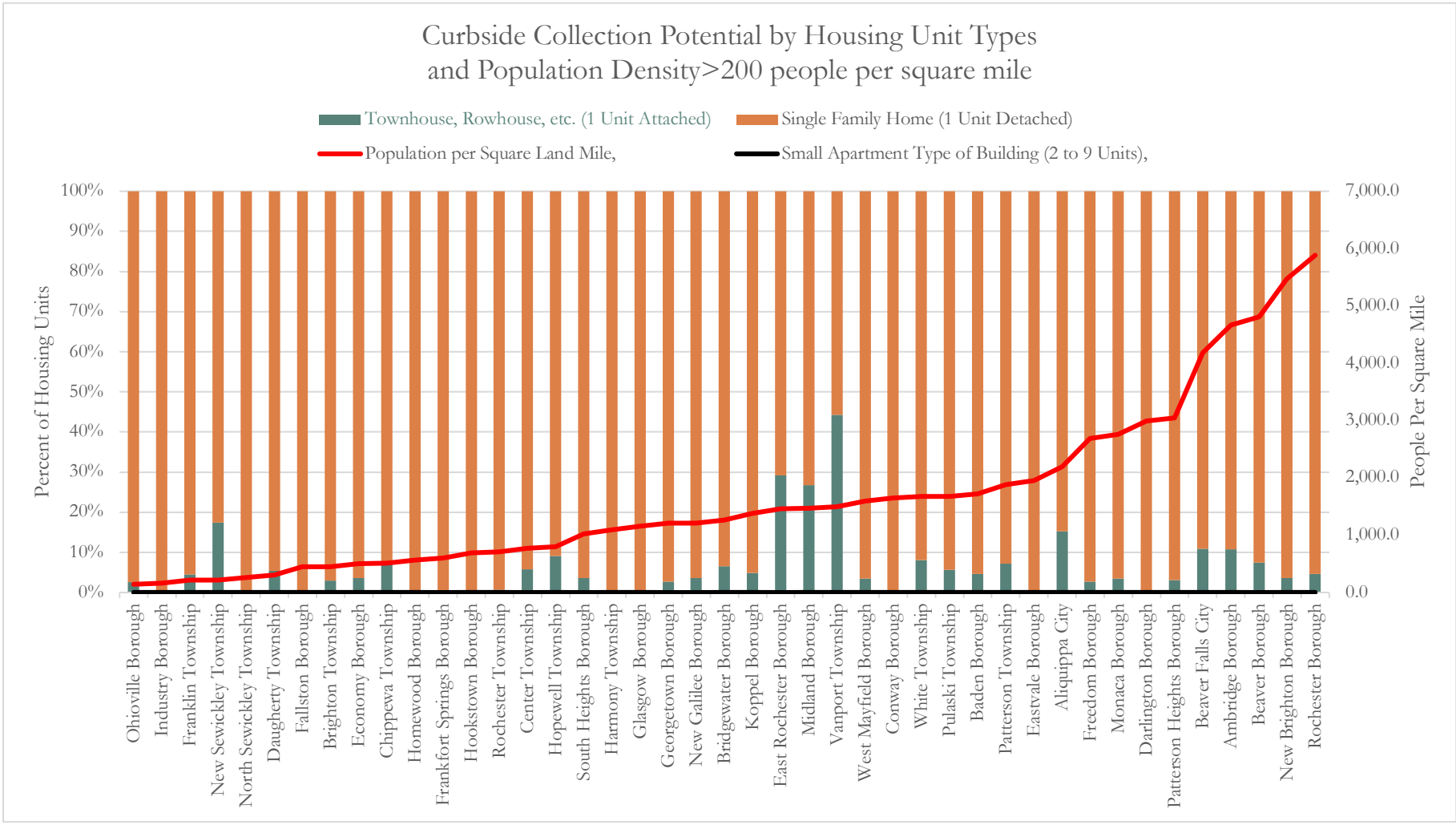
Observation

The graphic demonstrates that the majority of communities have more than 1,000 people per square mile and that single family detached homes are predominant everywhere. Waste services can be more difficult to deliver cost effectively in rural areas, particularly if subscribing to such services is voluntary. Of the 53 municipalities, only 4 have fewer than 200 people per square miles and 8 have fewer than 100 people per square mile. That means the vast majority of municipalities have conditions favorable to waste and recycling curbside collection. Because of their proximity to contiguous municipalities with curbside services, it is possible that even in the lesser populated areas, curbside collection of waste and recycling is feasible.

The evidence suggests that since waste management is considered a local issue, and that curbside collection or a workable alternative seems feasible in nearly every

municipality, it could be time to reevaluate the effectiveness of drop-off recycling collection. This type of exercise and findings and the consensus of the SWAC have led other counties to conclude that funds might be better spent on different waste and recycling services and programs for hard to manage materials, which benefit all municipalities. Therefore, these issues and alternatives were discussed and considered by the Solid Waste Advisory Committee during the planning process. Committee members, however, felt strongly that the County's drop-off collection program should continue to service select areas provided sufficient funds were available to support the program.

FIGURE 1-4 POTENTIAL FOR WASTE & RECYCLING CURBSIDE COLLECTION BY MUNICIPALITY



POPULATION CHARACTERISTICS IMPORTANT TO WASTE MANAGEMENT

The makeup of a community influences the types of waste and recycling services needed and the appropriate methods of delivery. Age, education, cultural heritage, and other socio-economic factors often frame our opinions and expectations for public services and our sensitivities to environmental issues. A few of these elements surfaced during a review of Beaver County's current general demographic profile. Why each is significant to the development of Beaver County's waste management policies is discussed in the immediately following narratives.

RESIDENTS AND MOBILITY

Much like other Pennsylvania counties, Beaver County has been dealing with a declining population. This decreasing population is due primarily to deaths outpacing the number of births. Of Beaver County's current population, approximately 20 percent are less than 18 years of age and about 37 percent of the population exceeds 65 years old. In fact, between 2010 and 2022, this age group increased by 19. 8 percent. The median age is 45, however the population group between 35 and 49 actually declined by 13.1 percent from 2010-2022.

Although new construction does occur throughout the County, considering the age of the population it is not surprising that the median year for when homes were constructed is 1958. From that point, construction of owner occupied homes continued to grow from the 1960's and finally tapered off by 2010. The mobility rate determined by the American Community Survey shows that once established, however, 88 percent of Beaver County residents tend to be non-movers. Thus, retention of the existing population has moderated what could be a greater decrease in population due to death and the loss to those moving out.

In 2022, approximately 88 percent of Beaver County residents had resided in the same home the previous year. There is internal mobility with a number of municipalities actually experiencing population increases. Some of the influx of new residents into these growing areas is actually the movement of individuals and families relocating from other Beaver County municipalities. Most of the remainder of new residents have relocated from within the Pittsburgh Metropolitan Region. In communities with a long-standing resident portion of the population, it is easier to understand local waste management practices and predict future needs. It can also be more difficult to initiate change, introduce new services, and enforce different policies. When other events and circumstances occur, they can provide a much needed catalyst for progress which might otherwise not come naturally.

It is common for transplanted residents to bring with them greater expectations for public services than traditionally have been offered in municipalities where a

rural environment was present. In Beaver County, the development of new residential plans may facilitate the growth of the waste management and recycling infrastructure within those municipalities. In turn, in older communities where growth has been slowed or restricted, the service offerings to local residents might not be as equitable or progressive. Often in local governments where these service demands are new, the infrastructure for waste and recycling services may be slow to develop. Distance and travel time have a huge impact on the overall cost of providing waste and recycling collection services. Therefore, understanding these variables is important in developing sustainable and affordable programs to which these transplanted residents have become accustomed. Regionalization and/or coordination of contracted services is a viable solution in many of these scenarios. During the planning process, these varying conditions in Beaver County were examined. Solid Waste Advisory Committee members who represented various classes of municipal government suggested that the County should consider an outreach program to help local officials improve the terms and conditions of their contracts.

AGE AND EXPECTATIONS

Life experiences influence our perspectives on any number of issues, including waste management and recycling. Each generation begins to formulate their sense of normal based on their exposure to certain concepts in their youth. The farther away in years one generation is from the values, technologies, and lifestyles introduced to another generation during the formative years, the greater the disparity. This foundation differs with each age group. It serves as a gateway through which all other information is filtered.

For instance, the Greatest Generation grew up in times of the Great Depression followed by a world at war. Frugality and conservation were a necessity of life. Reuse, repair, and recycling became routine. They learned to cook from scratch and use the leftovers to create subsequent meals.

In comparison, during childhood, following generations experienced prosperity. They were introduced to planned obsolescence, pre-packaged foods and single use items designed to be discarded not repaired. Incorporating leftovers into other meals was no longer in vogue.

Consequently, each group's perception of wasteful, convenient and practical differ. Effective waste management communication and education programs are cognizant of these variables. Implementing successful waste and recycling programs starts with knowing the generational make-up of the community.

LOCAL GENERATIONAL TRENDS

- Defining the Generations

Generation Z
Born 1998-2012
Ages in 2022 -10-24

The Millennial Generation
Born 1981-1997
Ages in 2022 25-41

Generation X
Born :1965-1980
Ages in 2022 42-57

The Baby Boom Generation
Born 1946-1964
Ages in 2022 58-76

The Silent Generation
Born 1928-1945
Ages in 2022 77-94

The Greatest Generation
Born Before 1928
Ages in 2022 95-100+

During the ten-year implementation period for this update of the Beaver County Municipal Solid Waste Plan, the current dynamics of age and generational norms will evolve. The most influential changes are expected to occur at either end of the current median age spectrum. During this time, the Millennial Generation is expected to represent the greater portion of the adult population. At the same time a higher percentage of the Baby Boom Generation will be in their seventies and eighties. More people from Generation X will be retiring and facing a transitional lifestyle. Baby Boomers, Generation X, and even Millennials who at that point will be becoming empty nesters will be looking to downsize from their larger homes. Current trends indicate these individuals will transition from single family detached homes to smaller multi-unit condos, carriage homes and/or apartment rentals.

Waste diversion through collection of materials for recycling and organics for composting is more challenging in multi-family dwellings. As more units grow, the County will need to address this issue. Better and more frequent education is necessary in multi-family settings. In some cases, to ensure that this portion of the population has access to these services, changes may be necessary in building codes to accommodate for adequate container space not only in the residence, but also outside in communal collection areas.

Baby Boomers and Millennials are already impacting the current composition of the waste stream. With smaller households and more active lifestyles, both groups lean toward single serving portions to avoid food waste and for pure convenience. Take-out meals, flexible pouches, K-cups, and rigid plastic trays continue to increase. Even when the content of these packages is listed as recyclable, it can be misleading. The items are difficult to sort and have very limited markets. Another notable change is the ongoing decrease in newsprint, magazines, and high grade office paper. Millennials and Generation Z (born after 1997) get their news and advertising information from digital media services and likewise communicate across these networks. Of course , because they are the most popular form of communication, dealing with discarded electronic devices will continue as a major factor.

Based on how these indicators play out locally, communities will need to periodically reassess local waste composition to determine if any changes are needed in collection, processing and disposal practices or education.

Getting the Millennials and Generation Z to actively recycle may be more challenging than expected. After lifetime exposure to environmental issues like global warming, Millennials overall confirm their belief in climate change and the consequences of human actions. A number of studies each lend credence, however, to the suspicion that in spite of high expectations for responsible corporate behavior, and sustainable goods, as a group millennials may not act the way they think. Generation Z may follow this trend. A higher percentage of Millennials surveyed say their households do not recycle. Similarly, one in five claim that they recycle infrequently or not at all. Another consumer study conducted by the Shelton Group, found Millennials less likely to recycle, to shut out the lights or turn off devices to conserve energy. Millennials do react to cause-based marketing. Using the power of their wallets to support the environmental initiatives of others is status quo. Taking direct action is not. So, while Millennials favor the concept of recycling, they might not physically take the time to sort and deposit materials in a separate bin. For this reason, it is possible that recycling rewards programs may suit Millennials better than other age groups.

DIVERSITY

Although Beaver County residents are predominantly Caucasians, a diverse resident population continues to expand. According to the US Census Bureau and the Penn State Data Center approximately 13 percent of the population is from other racial or ethnic groups, primarily Black. With less than 2 percent of the population predominantly speaking another language in the home, Beaver County has yet to face the problem of language barriers in its public outreach and education campaigns and materials. However, it is always an issue to consider and prepare for as demographics change.

ECONOMIC BASE

Overall, the County has diverse and often lucrative employment opportunities. The largest categories of employers are in the medical and health industry, education, energy and utilities, and manufacturing. Large retailers and wholesalers also factor significantly. Figure 1-5 shows the top employers according to the Quarterly Census of Employment and Wages and the Center for Workforce Information and Analysis.

FIGURE 1-5 TOP EMPLOYERS IN BEAVER COUNTY

pennsylvania
DEPARTMENT OF LABOR & INDUSTRY
CENTER FOR WORKFORCE INFORMATION & ANALYSIS

Top 50 Employers

Beaver County

1st Quarter, 2024

Combined Government Ownerships

Rank	Employer	Rank	Employer
1	Valley Medical Facilities Inc	26	Big Beaver Falls Area School District
2	Wal-Mart Associates Inc	27	Beaver County Rehabilitation Center
3	Beaver County	28	Brighton Rehab & Wellness Center
4	Energy Harbor Nuclear Corp	29	Life Beaver County
5	Veka Inc	30	Gateway Rehabilitation Center
6	Tenaris Bay City Inc	31	Community College of Beaver County
7	Chippewa Inc	32	SelectRx
8	Giant Eagle Inc	33	Freedom Area School District
9	Heritage Valley Medical Group Inc	34	Riverside Beaver County School District
10	McGuire Memorial	35	New Brighton Area School District
11	Eaton Corporation	36	Duquesne Light Company
12	Shell Chemical LP	37	Dolgencorp LLC
13	The PA Cyber Charter School	38	Beaver Valley Intermediate Unit
14	Lindy Paving Inc	39	South Side Area School District
15	State Government	40	DMS East LLC
16	Hopewell Area School District	41	BVPV Styrenics LLC
17	Stoelzle Glass USA	42	Moderne Glass Co Inc
18	Geneva College	43	Versatex
19	Fresh Foods Manufacturing	44	Lincoln Learning Solutions Inc
20	Concordia Lutheran Ministries-Pgh	45	H D S of Beaver Falls Inc
21	Beaver Area School District	46	Thomas 4 Limited
22	Blackhawk School District	47	Nalco Company LLC
23	Ambridge Area School District	48	RAM Acoustical Corporation
24	Federal Government	49	Ardex Engineered Cements
25	Central Valley School District	50	Pennsylvania State University

Source: Quarterly Census of Employment and Wages

PERSONAL WEALTH AND INCOME

The mean annual household income in Beaver County is $85,850. For families and married couples, the mean annual income increases to $104,997 and $117, 616, respectively. Non-family households have the lowest incomes at $50,100. Municipalities with the highest overall incomes include Brighton, Center, Chippewa, Daugherty, Franklin, Greene, Independence, Marion, Potter, and Raccoon Townships along with Economy, and Georgetown Boroughs. Among the municipalities with the very lowest overall incomes the Cities of Aliquippa and Beaver Falls, as well as the Boroughs of Ambridge, East Rochester, Eastvale, New Brighton, and Rochester.

Although a large portion of the population is fortunate enough to earn a comfortable living wage, poverty does exist within Beaver County. Based on US Census Bureau estimates from 2018-2022, the population considered to have incomes that fall below the poverty level totals 10.4 percent. Of those who are employed, 4.4 percent fall within this category, while 22.6 percent of the unemployed do. More females than males live in poverty, as well as more children under 5 years of age. If for no other reason than the availability of affordable housing, poverty is more concentrated in the boroughs and city than in the townships. Clearly, more affluent families and individuals live in the townships.

The amounts and types of municipal waste generated in a community are influenced by the employment status and incomes of local residents. In addition, both the volume of municipal waste and its composition are dependent on the types of businesses, and services that exist. Economic conditions, therefore, must be considered when planning for municipal waste management.

Low income families can be more dependent on public services like waste and recycling collection than those who can afford other alternatives. Ironically, the tax base to support such services tends to be lesser in these areas. Direct user fees for waste management services are becoming the norm. “Willingness to pay” is a determining factor in implementing waste management and recycling programs. Programs designed with cost sensitivity to household incomes are likelier to gain public acceptance and to succeed.

“WILLINGNESS TO PAY” IS A DETERMINING FACTOR IN IMPLEMENTING WASTE MANAGEMENT AND RECYCLING PROGRAMS.

PROGRAMS DESIGNED WITH COST SENSITIVITY TO HOUSEHOLD INCOMES ARE LIKELIER TO GAIN PUBLIC ACCEPTANCE AND TO SUCCEED..

In a throw away society, those with greater discretionary income buy and replace items more frequently than those on restrictive budgets. When finances are not a factor, it is easier to discard misguided and/or excessive purchases without remorse. Following that logic, one would expect greater amounts of waste in communities with higher incomes. In wealthier communities, items may be discarded in good, if not excellent, condition simply because the items are no longer desired. A large portion of these discards are suitable for reuse, refurbishment and resale. Although secondhand, thrift, and consignment stores receive a steady flow of these items, many still remain in the waste disposal stream. Field observations to determine the types and frequencies of recoverable items collected at the curb provide valuable insight to develop alternative diversion and management programs.

Proper waste management practices help to maintain the environmental quality of the County, protect its natural resources, and prevent pollution and degradation of local assets. Issues such as illegal dumping, littering and open burning were assessed during the planning process. Minimizing these activities and their consequences is considered an important priority in Beaver County.

MUNICIPAL SOLID WASTE BASICS

Most of us are more familiar with municipal solid waste than we realize. Each day we engage in activities that generate municipal solid waste. We produce it where we live, where we work, where we shop, in our schools, in our medical facilities and in a host of other community activities. The USEPA reports for 2018, the baseline for data utilized in the Plan, that each person in the United States generated an average of 4.9 pounds of municipal solid waste per day.

Essentially, things we purchase or acquire become municipal solid waste when they are discarded. Each discarded item proportionately affects the overall composition of the total municipal waste stream. Municipal solid waste is relatively consistent across the nation. From region to region, a number of factors may cause the content of municipal solid waste to fluctuate slightly. Income, education, geography, weather, and other demographics influence the types and amounts of items purchased and ultimately discarded. But those differences are becoming lesser than in the past.

With the growth of big box retailers like Walmart and the popularity of online shopping sites like Amazon, and television shopping networks like QVC, our purchasing habits are more homogenous than ever before. There is no longer lag time for trends to make it from the coasts to the heartland. New products and goods can be introduced online and arrive on retail shelves in Los Angeles, Phoenix, Detroit and New York City, etc. on the same day.

Nationally, there are fewer differences in our purchases and discards since the popularity of Big Box retailers and online shopping has grown.

The advancements in product distribution affect the make-up of our discards as well. Not only do product trends shift rapidly, but also packaging. Unfortunately, material recovery facilities can be ill-equipped to collect, process and market the continually changing types and volumes of resulting material.

Understanding what is in the waste stream is the first step in determining the best methods for handling and processing various materials, and targeting those that can be recovered for recycling, composting, or to produce energy. Knowing the components of the waste stream also serves to identify how waste might be minimized through product and packaging design, purchasing habits, and greater consideration for reuse and repurposing.

Often a physical sort of the local waste stream is conducted to provide precise data. Because that can be a costly process, benchmarking against accepted sources of information is an acceptable alternative.

NATIONAL PERSPECTIVES ON MUNICIPAL SOLID WASTE

The United States Environmental Protection Agency (USEPA) collects and analyzes data on waste generation, disposal, and diversion. Its database of information dates from 1960 through the present.

This wealth of accumulated information establishes historic trends and changes. It is a useful tool to make initial assumptions and to reveal significant differences and/or anomalies in local programs based on national behaviors and performance. Until recently, USEPA documented detailed findings for each year. That made it possible to compare local data from specific years to actual performance at the national level. Those USEPA reports were published as *"Characterization of Municipal Solid Waste in the United States."* The most recent iteration was published in 2020. It coincides with the data utilized in analyses during the planning process is titled *"Advancing Sustainable Materials Management: Facts and Figures 2018."* For unknown reasons, USEPA has not published any updates since that time.

Nevertheless, USEPA's ongoing study continues to serve as the definitive survey on the characterization and composition of the national waste stream. The series has been challenged, and refuted, but no other source has been able to consistently provide this level of detailed data on the subject. Critics regularly fail to take into account the parameters and criteria USEPA uses to define and categorize municipal solid waste. From state to state to state, including Pennsylvania, there are slight variations in the materials which are tracked and monitored, which differ from the federal interpretation. Therefore, to conduct an accurate analysis it is important to understand the federal criteria and limit the comparison to materials and products that meet the definition of municipal solid waste. Lacking another reliable benchmark, USEPA's database is used as a reference and base of comparison throughout the analyses in the Plan. The next section discusses where similarities and differences may exist between the federal criteria and in Pennsylvania's laws and regulations.

From state to state to state there are slight variations in which materials are reported. These may differ from the federal interpretation of municipal solid waste.

To conduct an accurate analysis, it is important to understand the federal criteria and limit the comparison to materials and products consistent with the USEPA definition of municipal solid waste.

REGULATORY INFLUENCES

As commonplace as municipal waste can be it is equally confusing on several levels. An extensive set of federal, state, and local laws and requirements create the regulatory framework for the broad spectrum of solid waste management. Inconsistencies in the scope of materials and categories considered solid waste exist from state to state and between states and the federal government. It can be problematic to interpret and compare data accurately unless the differences are identified upfront. To complicate things further, where and by whom municipal solid waste is generated can equally affect how it is defined and categorized.

DEFINING SOLID WASTE BY ITS SOURCE

Defining a waste by who generates it or by where it was generated, rather than by its chemical or physical characteristics or environmental impact is often a more practical way for regulatory agencies to monitor and enforce proper waste management practices. Therefore, there are items commonly found in industries and households alike that are regulated differently and require different disposal methods for each source.

The USEPA definition of municipal solid waste encompasses the materials discarded by residents, commercial businesses, and institutions. It excludes materials generated by manufacturing and industrial activities. A further distinction is made in planning for and managing municipal waste based on whether the source is commercial or residential.

It is important to understand the regulatory and practical basis for categorizing the sources of municipal waste because, while the overall contents of the waste stream remain the same, the proportion of the materials differs in each category. This becomes a major consideration in developing recycling and other waste management technologies and diversion programs. Chapter 4 of the Plan is devoted to a detailed analysis of the specific materials in the waste stream and the sources where they are most likely to be found, and their ability to be recovered for recycling. In Chapter 1 the foundation for that analysis is established by identifying the various sources of municipal waste in Beaver County and the degree which each contributes to the total amount generated.

ANATOMY OF THE WASTE STREAM

There are a number of categorized subsets of solid waste. In general, USEPA considers discards from residential, commercial, and institutional establishments to be the "municipal" subset of solid waste. It is commonly referred to as "MSW."

Municipal solid waste consists of everyday items such as product packaging, grass clippings, furniture, clothing, bottles, food scraps, newspapers, appliances, and batteries. In addition to identifying specific groups of materials like metals, glass, paper, or plastic, broad categories of products are also used in analyses of municipal solid waste. These include durable goods, non-durable goods, containers and packaging, organic wastes such as food and yard trimmings, and miscellaneous inorganic wastes. Although each may consist of one or more recyclable materials, categorizing them by product is a more accurate way of describing what we purchase, discard, and recycle.

For instance, we all have windows, mirrors, and decorative glassware in our homes. Yet when we talk about recycling "*glass"* in municipal programs, we generally mean glass bottles and jars. Similarly, when "aluminum" is mentioned

in the context of municipal recycling programs, we mean aluminum cans and foil, not siding and scrap metal.

Using the product categories clearly illustrates the relationship between product design, purchasing habits, and waste generation. With the emergence and growth of product stewardship and extended producer responsibility legislation and regulations, there is increasing demand for sustainable design that allows for remanufacturing, reuse, and recycling.

A description of the USEPA products categories is shown in Figure 1-6.
Figure 1-7 provides a detailed breakdown of the composition of municipal solid waste generated in 2018 according to the USEPA. The chart represents the total waste generated prior to recovery of materials for recycling and prior to disposal. It is based on the weight of the material.

FIGURE 1-6 USEPA PRODUCTS WITHIN IN MATERIAL CATEGORIES OF MUNICIPAL SOLID WASTE

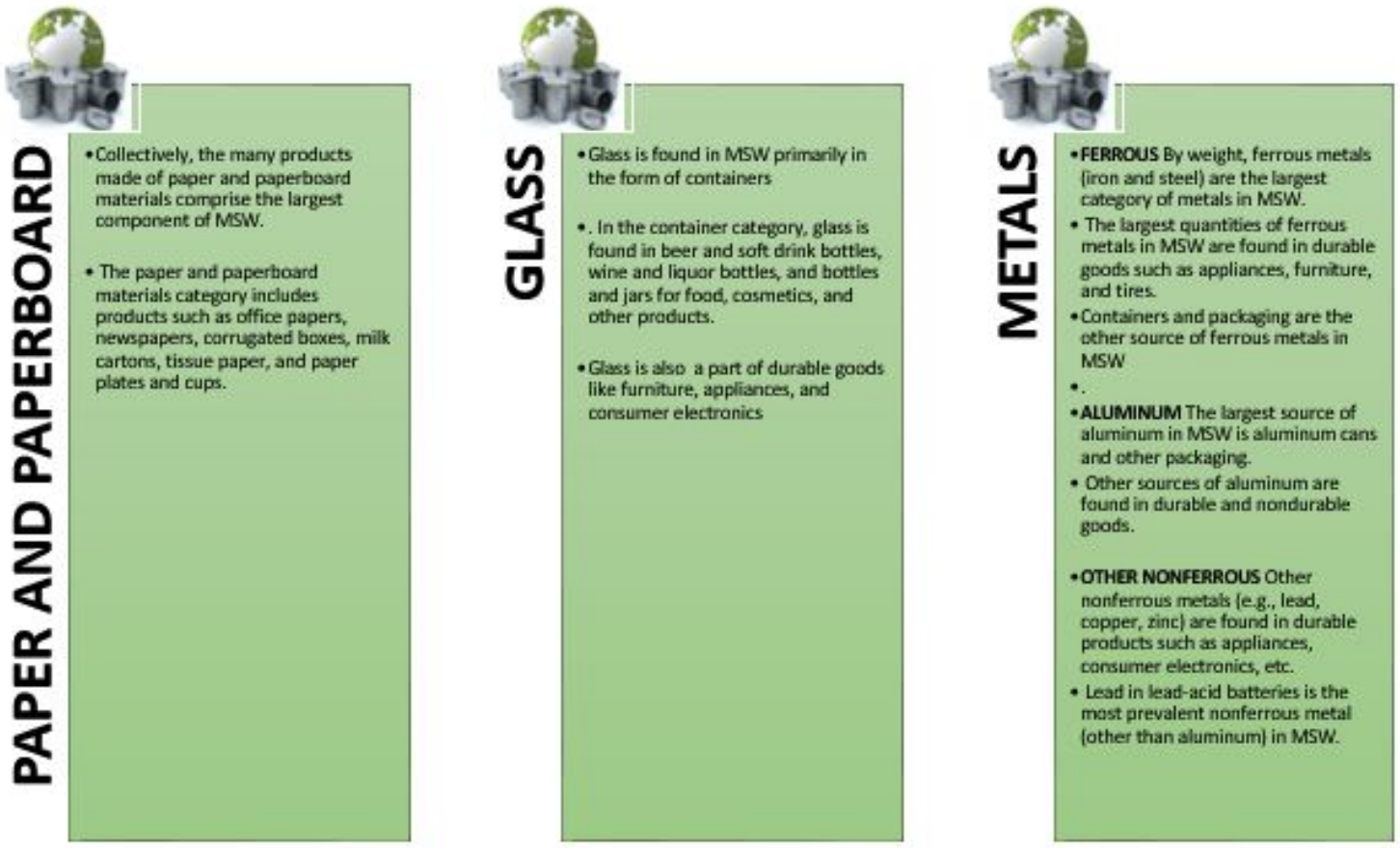
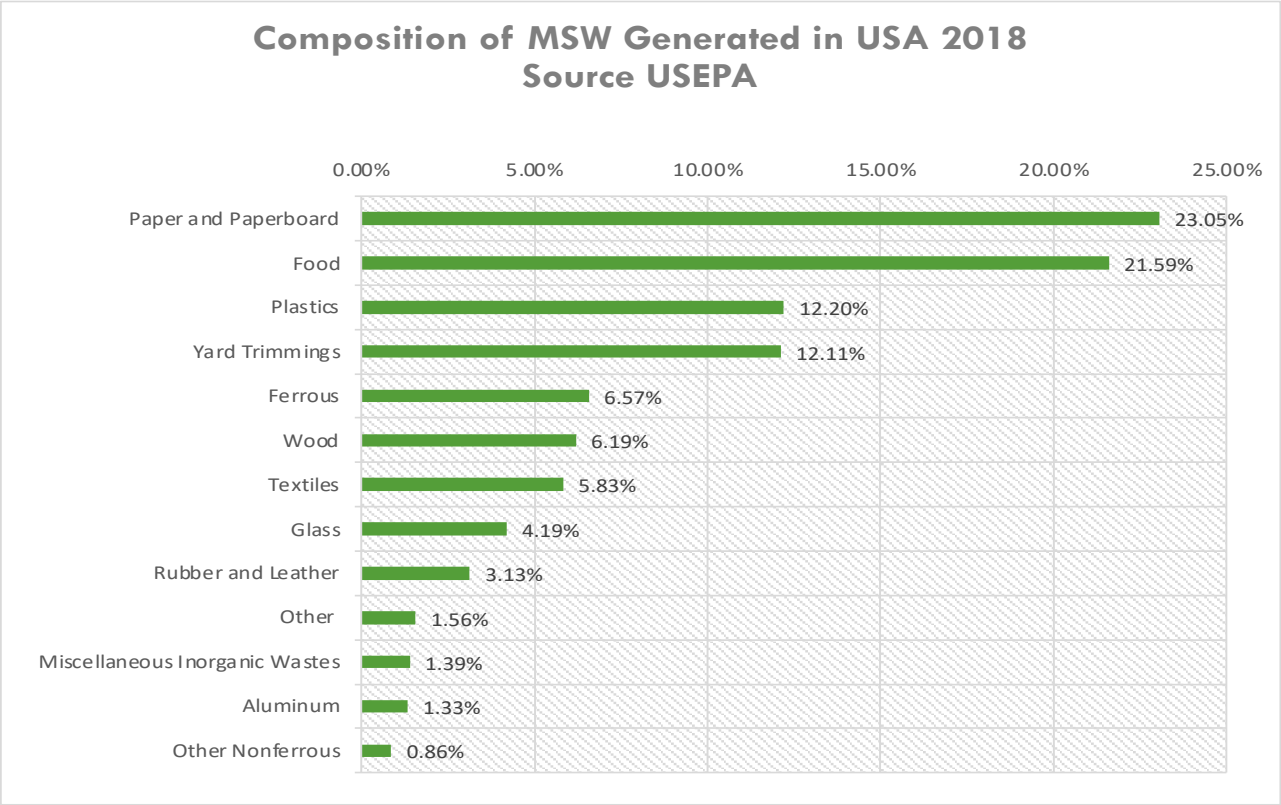


Figure 1-7 National Municipal Waste Generated Material Composition per USEPA



COMPONENTS UNIQUE TO PENNSYLVANIA

There are some other subsets of the solid waste stream with unique characteristics or which require special handling. USEPA, along with many states, do not factor these particular types of materials into the overall quantities of municipal waste. In Pennsylvania, however, waste from construction and demolition activities, medical waste from health care facilities, biosolids, and sludges from wastewater treatment all fall within the regulatory framework of municipal solid waste. Therefore, in the planning process, Pennsylvania counties must address how each is managed.

For comparative purposes, in Pennsylvania it is only the data in disposal facility reports under the "municipal" category, which correlates to municipal solid waste as defined by USEPA. It should be noted that discussions of and projections for residential and commercial/institutional municipal waste generation and recycling within the Plan do not include special handling wastes. Estimates for these types of municipal solid waste and detailed discussions of how they are managed are provided separately.

NOTABLE TRENDS IN MUNICIPAL SOLID WASTE

For a long while many considered the municipal solid waste stream was somewhat stable and predictable. In reality, over the past 50 years USEPA studies document the quantities, composition, and recovery of municipal solid waste vary considerably.

Because of these changes, the rationale used to assess and project waste management needs at the enactment of the Municipal Waste Planning, Recycling and Waste Reduction Act in 1988 (Act 101) is not necessarily applicable in 2024. In fact, circumstances have shifted so dramatically within the past fifteen years that decisions made during the last planning period may be off target as well. This section offers a brief discussion of the evolution of municipal waste based on nationally documented trends and changes. These findings form the current assumptions used throughout the planning process to assess the validity or anomalies of local data and programs operating within Beaver County.

ADVANCEMENTS IN WASTE DIVERSION

The dynamics of how materials found in municipal waste are managed in 2024 differ from the options available in 1960. When USEPA began to track this information over 50 years ago, the waste industry as we know it today barely existed. There were approximately 1,800 landfills in Pennsylvania, mostly open dumps owned and operated by local governments. Garbage collection was prevalent only in cities and densely populated communities. Recycling was limited to scrap dealers.

Today fewer and larger waste collection and disposal companies compete in the marketplace. Public facilities are designed and operated under the same technical and regulatory criteria as the private sector. Recycling is more commonplace and the prevalence of curbside recycling collection is far greater than in the past. The diversion of yard waste and other organic matter from disposal has increased. The changes are partially due to recycling legislation, similar to Act 101, which was enacted in many states beginning in the 1980's. The development of the collection, processing infrastructure for a wider variety of materials also is a factor.

MUNICIPAL WASTE GENERATION TRENDS

Although alternative management options such as recycling and composting have had an effect on the amount of waste landfilled, an even more significant trend is the decrease in the amount of waste produced on a per capita basis. Population has a direct effect on the amount of waste generated in an area and subsequently for which local governments are responsible to plan for and manage. Generally, where there are more people there is more municipal waste to manage.

From 1960 to 1990 the amount of municipal solid waste generated on a per capita basis exceeded the population growth rate. The total amount of municipal solid waste generated in the United States has approximately tripled over the 50-year period tracked by USEPA. Part of the increase is directly related to the growth of the population during that same period. However, individual consumer patterns were also a contributing factor. In contrast, over the past decade the quantity of material generated and discarded has been relatively constant.

In 1960, each person in the United States generated approximately 2.68 pounds of municipal solid waste per day. From 1960 to 1990, the per capita rate grew at an accelerated pace to 4.57 pounds per person per day. That pattern has stabilized and in fact appeared to be on a downward trend. Since 1990, the per capita rate has slowed, peaking briefly in 2000 at 4.74 pounds per person per day. The current daily waste generation rate of 4.9 pounds per person is higher than the previous peak of 4.74 pounds per person per day seen in 2000, and the 4.57 pounds per person per day rate at the height of a thirty-year escalation in consumerism in 1990. The increase today is due mainly because USEPA enhanced its food measurement methodology to more fully account for all the ways wasted food is managed throughout the food system.

THE EVOLVING WASTE STREAM

The shift in the amount of municipal waste generated per person is not due solely to economic conditions, a shift in individual purchasing habits, nor to significant trends in waste minimization and source reduction. Instead, the growing amount of food waste during a time when a higher percentage of the population is facing food insecurities has captured attention. Initiatives have been launched to halt the practice of wasted food in the fields to the moment it becomes food waste when the consumer discards it.

While food waste has increased, in contrast5 to this effect corporate goals and shareholder demands for greater returns on investment have focused on reducing the cost of energy in the form of transportation and waste have reduced by weight many other types of products in the municipal waste stream.

These objectives have placed increasing burdens on designers. They are expected to develop products and packaging that use fewer raw materials, consume less storage and transport capacity, are packaged with the minimal requirements to preserve the product, and with packaging that can be reused. The phenomenon is referred to as light-weighting. The intended results are lower fuel costs, more revenue per shelf space, and less waste to manage, even if it is through recycling. To accomplish this, food and beverage containers, including glass, are now thinner and lighter. Many products once sold in glass bottles or jars have now shifted to plastic or aluminum versions. Cardboard boxes have been replaced by shrink wrap.

Detergents and other cleaning products have become concentrates sold in containers less than 30 percent of the former packaging.

Another market shift is from printed material to electronic formats. Newspapers, magazines, books, and first class mail items have been replaced by the Internet, e-books, and email. Even the electronic devices used to deliver the news and other communications weigh less in every new iteration.

Interestingly, the shift to plastic may have reduced weight, but it has created another challenge. Low density plastics are greater in volume and consume more storage container and vehicle capacity. This could add to the transportation costs of curbside and drop-off collection programs in some municipal collection programs.

SUCCESSFUL WASTE DIVERSION

Municipal solid waste generation nearly tripled by weight over the past 50 years; however, the quantity that USEPA labels "discarded," also commonly referred to as "disposed," only doubled. This is attributable to the success of programs designed to divert waste from disposal to recycling and composting.

The proportion recovered through recycling and composting programs grew from less than 7 percent of total municipal solid waste generated in 1960 to 34 percent in 2018, and approximately 37 percent if food waste recovery is factored in. Energy production from waste materials was negligible in 1960 and now waste to energy facilities manage nearly 13% of the material discarded. Although still the dominant disposal option, landfills receive roughly 52 percent of the waste stream disposed.

The growth in recycling was rapid from 1980 through 2000, a direct result of state-level initiated regulatory changes. Pennsylvania's Act 101 is an example of the type of legislation adopted by a number of states that included mandates and incentives to increase recycling. The pace of recovery plateaued after 2000 and the trend has been rather constant for the past twenty years.

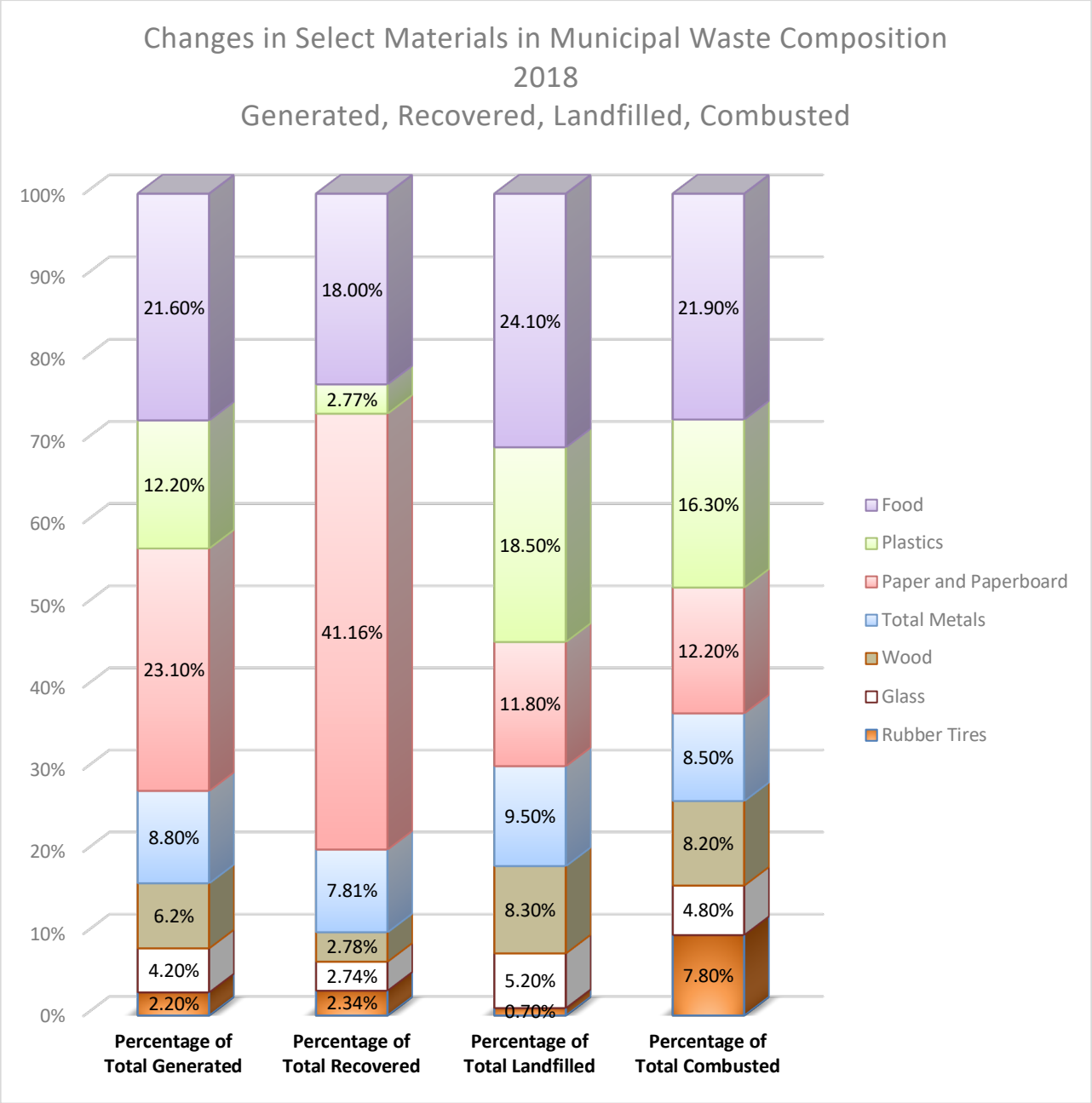
A trend toward individual use items increased the volume of packaging required for shipping and marketing, which was the key factor in the evolving makeup of the municipal waste stream. The change presented a greater need and opportunity to recover materials. Because only recyclable materials are removed, there is a proportional change in the composition of materials recovered compared to the composition of the waste generated. Likewise, once material recovery occurs, the composition of the municipal solid waste disposed differs from both the waste generated and the materials recovered.

Table 1-4 shows a side-by-side comparison of national waste generation, recovery and disposal composition for 2018. This table shows how the proportion of materials shifts when specific materials are captured for recycling and composting. It also illustrates some of the products from which numerous types of materials may be recovered. Figure 1-8 illustrates the impact of recovery for recycling, composting, and other forms of food waste management on the composition of materials generated and disposed. The chart shows select materials commonly found in municipal recycling programs.

TABLE 1-4 2018 USA MUNICIPAL WASTE COMPOSITION AND MANAGEMENT

	Percentage of Total Generated	Percentage of that Total Material Recovered	Percentage of Total Landfilled	Percentage of Total Combusted
MATERIALS				
Paper and Paperboard	23.10%	41.16%	11.80%	12.20%
Glass	4.20%	2.74%	5.20%	4.80%
Total Metals	8.80%	7.81%	9.50%	8.50%
Plastics	12.20%	2.77%	18.50%	16.30%
Rubber and Leather	3.10%	1.50%	3.40%	7.20%
Textiles	5.80%	2.25%	7.70%	9.30%
Wood	6.2%	2.78%	8.30%	8.20%
Other	1.50%	0.87%	2.00%	1.90%
Food	21.60%	18.8%	24.10%	21.90%
Yard Trimmings	12.10%	19.97%	7.20%	7.40%
Miscellaneous Inorganic Wastes	1.40%	0%	2.30%	2.30%
PRODUCTS				
Major Appliances	1.80%	2.81%	1.40%	0.00%
Small Appliances	0.70%	0.11%	1.10%	1.20%
Furniture and Furnishings	4.10%	0.04%	6.60%	6.80%
Carpets and Rugs	1.20%	0.28%	1.70%	1.70%
Rubber Tires	2.20%	2.34%	0.70%	7.80%
Batteries, Lead-Acid	1.00%	2.57%	neg	0.00%
Selected Consumer Electronics	0.90%	0.93%	neg	neg
Other Miscellaneous Durables	7.60%	0.39%	neg	neg

FIGURE 1-8 VARIABLES IN WASTE COMPOSITION



MUNICIPAL SOLID WASTE TRENDS IN BEAVER COUNTY

The findings of the USEPA over the past 50 years present a reliable snapshot of the average waste generation, recycling, and disposal trends in the United States. It is reasonable to expect that from region to region a number of demographic variables could cause local statistics to differ somewhat from those reported by USEPA. The source of the material can also influence locally reported results. For instance, waste from strictly residential settings tends to differ slightly in composition from waste generated only by commercial establishments. These variables are identified in the national study to help program managers better interpret their data.

Understanding what is common or normal in the majority of communities across the nation provides a sufficient benchmark for evaluating local data and examining current conditions in Beaver County. Comparing the USEPA information to Beaver's reported data provides insight into prevailing trends and developing conditions that could affect future solid waste management capacity needs and the development of treatment and processing methodologies.

DETERMINING LOCAL GENERATION, RECOVERY, AND DISPOSAL RATES

Beaver County's disposal and recycling reports reveal that the same changes witnessed nationally occur here. Details of the local disposal practices are discussed in more depth in Chapter 2. The County's recycling programs and performance are presented in Chapter 4.

The reported results of both disposal and recycling activities, when compared to the national performance trends, show Beaver County deviates on a per capita basis. The variances are not enough to warrant concern because there is legitimate evidence to explain the anomalies. Therefore, state and local data combined with insight supported by national research was used to determine the local waste generation, recovery, and disposal figures and to project future needs.

Population is used to calculate the generation, disposal and recovery rates on a per capita basis. It is also used to estimate generation, recovery, and disposal when a per capita rate is assumed. The population of the United States in 2018 was estimated at 326.6 million people. The United States generated approximately 292.4 million tons of municipal solid waste during that same year, which is the equivalent of 4.9 pounds per person per day. That represents an increase from the 4.74 pounds per person per day seen in recent years, however, the increase is due primarily to USEPA's inclusion of additional wasted food management pathways to their traditional data.

Of the municipal solid waste generated, approximately 94 million tons, or 1.58 pounds per person per day, were recycled or composted. 69 million tons were recycled at 1.16

pounds per person per day, and 24.9 million tons of organic waste were composted at 0.42 pounds per person per day. An additional 17.7 million tons of food waste was diverted from disposal by other management methods at 0.30 pounds per person per day. Combined, this represents a 32.1 percent combined recovery rate, which is a decrease from the previous 34.7 percent According to the US Census Bureau, the 2022 estimated population in Beaver County was 167,129 In 2022 Pennsylvania landfills reported the disposal of 92,331 tons of municipal solid waste originating in Beaver County. This figure reflects adjustments made to the official state reports to reflect known irregularities influenced by the nature of transfer operations located in Beaver county and owned by Waste Management and Vogel Holdings. The adjustments represent a reconciliation of the fee data reported directly to the County which factors out waste from other sources received at the transfer stations. An additional 24,682 tons were reported from landfills located in Ohio and West Virginia, making the total municipal solid waste disposed for 2022,which is comparable to the USEPA definition, 117,013 tons.

Another 63,555 tons of materials designated for recycling in Act 101, including yard waste, and those meeting the USEPA definition for municipal solid waste were recovered in 2022 according to the County's reports. Thus, based on the reported data, the estimated amount of municipal waste generated in Beaver County in 2022 was 180,568 tons.

Figure 1-8 compares the national municipal waste per capita generation, disposal and recovery rates to those calculated from Beaver County's reported disposal and recovery tonnages for 2022. As calculated from the reported data, Beaver County's per capita generation rate is slightly higher than would be expected if Beaver County were to perform the same as the national norms. It also shows a significantly higher disposal rate and a relatively high rate of recovery. That could indicate that outside waste may mistakenly be attributed to Beaver County in local reports. Additionally, it is likely that a certain amount of construction & demolition waste is mixed in with the loads of municipal waste. Both of these are common occurrences when transfer operations are involved. These scenarios were considered during the planning process.

Figure 1-9 shows the 2022 estimated total tons of municipal solid waste generation, recovery, and disposal for Beaver County compared to the reported data for the same year. The estimates were calculated using the national waste generation criteria, the estimated 2022 population of 167,629 persons, and assumes the same national level of performance in recovery programs. Chapter 2 examines the data using extended years of reported tonnages and annual population changes.

FIGURE 1-8 NATIONAL AND LOCAL REPORTED GENERATION, RECOVERY, AND DISPOSAL PER CAPITA RATES

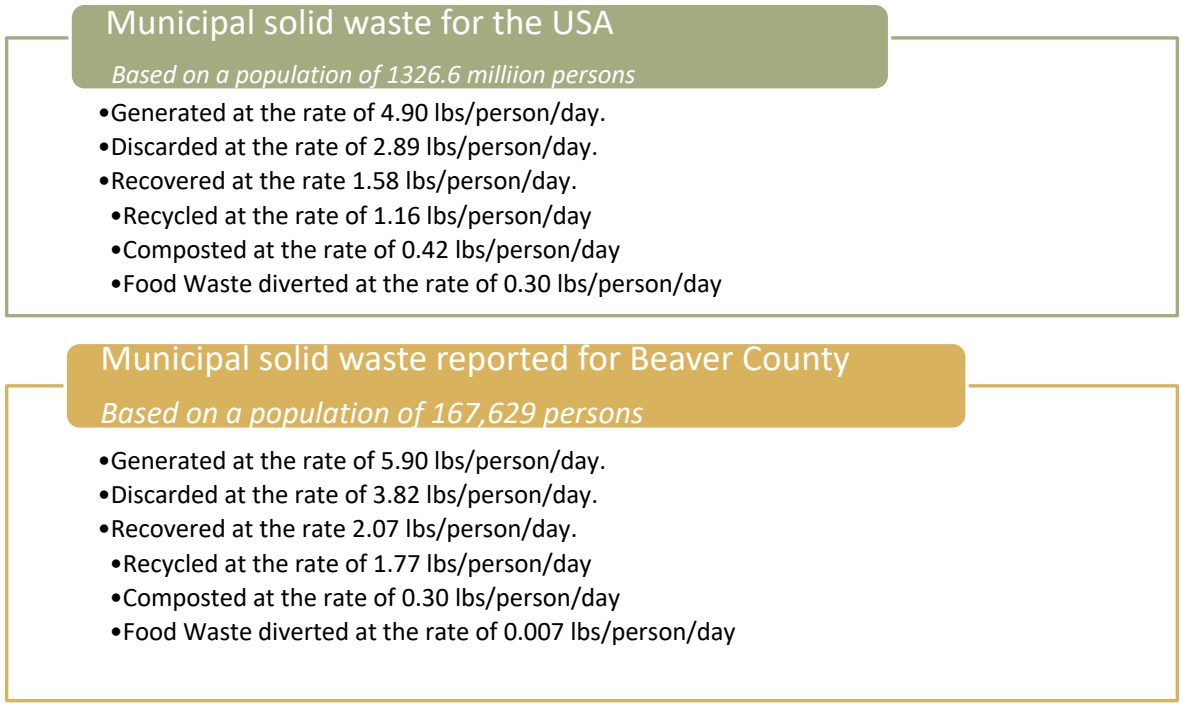
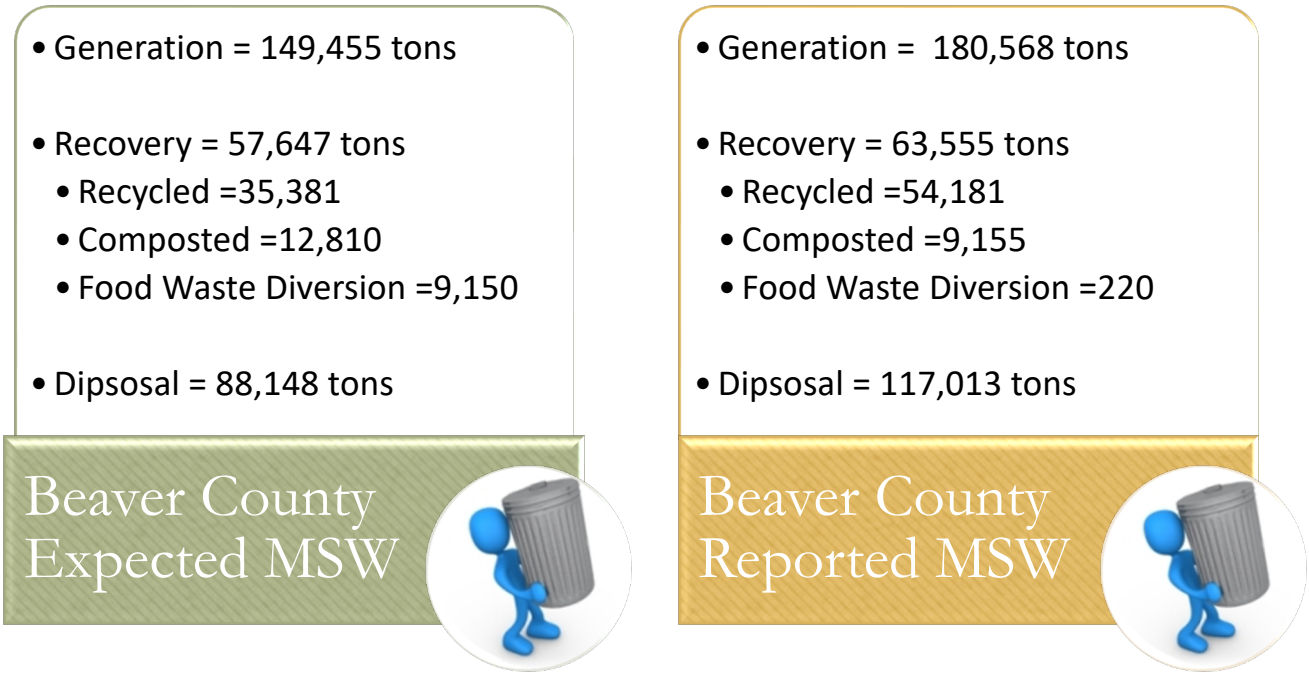


FIGURE 1-9 BEAVER COUNTY REPORTED AND EXPECTED TONS GENERATED, DISPOSED, AND RECOVERED 2022



SOURCES AND TYPES OF MUNICIPAL WASTE

In general discussions on the topic of municipal solid waste the aggregate of the materials produced by all associated activities and sources is generally referenced. For program managers and for planning purposes knowing the nature of the materials funneled into the waste stream from distinct points of origin offers better insight. First it can reveal opportunities to target new materials for recovery or enhance the performance of specific fractions of the community. In addition, program funding can be allocated where the best results for the investment are anticipated.

MUNICIPAL WASTE GENERATORS

Throughout the Plan, municipal waste is discussed in terms of two basic sources or types of generators. These are identified as residential and commercial. Residential sources include single-family detached homes as well as townhouses, condominiums, apartments, mobile home parks, etc. Commercial sources include all types of businesses, offices, government facilities, and institutions. Community events are typically included in this category as well. Industrial, mining, agricultural, and manufacturing activities are excluded from the definition of municipal solid waste generators.

Some operations produce specific types of municipal waste that require special handling during transportation and disposal. These include septage, sewage sludge and regulated

medical waste. In addition, some waste is uniquely associated with a specific activity such as construction & demolition activities. Although commercial sources clearly produce wastes from, wastewater treatment, health care, and construction and demolition activities, because of their unique composition, characteristics, and handling needs, these wastes are considered apart from general commercial waste for planning and management purposes.

RATIO OF MUNICIPAL WASTE GENERATED BY RESIDENTIAL AND COMMERCIAL SOURCES

Both the USEPA and the Pennsylvania Department of Environmental Protection (PADEP) reached similar conclusions in their individual studies to determine the origin of materials in municipal waste. Their research shows at least 54% of municipal waste is generated by a community's residents. Commercial activities account for the remaining 46% of the general municipal waste stream. For urban communities, commercial waste represents an even higher proportion. Those ratios are safe relative assumptions that can be used when looking at Beaver County on a broader spectrum. However, those proportions can shift significantly per municipality depending on population density and other traits that categorize the community as primarily rural or primarily urban.

Because landfills generally do not distinguish which tons disposed originated from residential or commercial sources on their reports, it is difficult to determine the ratio of residential and commercial waste. However, recycling activities are recorded this way. In Beaver County the reported quantities recycling, composting, and food waste diversion from residential sources represent 58% of the total tons recovered. Commercial quantities represent 42%. Some materials such as cardboard are recovered at a much higher rate than most materials in the residential waste stream. This could skew the ratio. On the other hand, commercial recycling often goes under reported, which likely balances the results. Therefore, proportionately, the distribution seems reasonable based on the County's demographics.

Brick and mortar commercial establishments are more successful when established close to their customer base and sources of revenue. In areas with the greatest concentration of population it is natural to see more commercial development. Consequently, the ratio of municipal waste from commercial sources is slightly higher in those communities than the national and state averages. In rural areas where there are more residences than businesses, commercial waste is significantly lower.

The ratio of residential and commercial sources within a community should influence the resulting programs and, services. Local ordinances and contracts should be geared to incentivize participation by making it easier and more affordable to comply than to ignore the law. Recycling goals should be adjusted to account for materials that are

primarily generated by commercial establishments in areas where retail and office buildings are prevalent. Ordinances and building codes should be designed to ensure spaces for commercial waste and recycling containers. Materials in multifamily dwellings may be more limited than in service to single family detached homes.

RESIDENTIAL PROFILE

As the name implies, residential municipal waste is generated by individuals who reside or live in Beaver County. Residential waste is typically collected from the curbside or roadway at the home where it is generated. In some instances, where several households may live in separate units within the same building, the waste from all of the units is placed into a universal container or dumpster. In remote rural areas or where homes are located at the end of long private roadways, conditions may be prohibitive for conventional collection vehicles to provide service. Residents may need to bring their waste to the nearest publicly maintained roadway. Many waste companies offer alternative service in which a smaller vehicle can maneuver the private road for an added charge. When these measures are unavailable, residents need to deliver waste to disposal facilities. It is important to know the types of residences that exist in the County to understand the types of services that are feasible in local programs.

In Beaver County, it's been shown previously in this chapter that the vast majority of residential generators of municipal waste live in single-family detached housing units. From a municipal waste collection perspective, single family detached housing units are advantageous because they are easily accessed and therefore most commonly serviced at the curb. This chapter also illustrates the communities where curbside collection is feasible.

Affordability is an important fact to consider as solutions to expand waste and recycling collection services within the County are explored. Where single family housing units are densely clustered in one community, or when a greater number of units are guaranteed to participate from joint municipal programs, the result is lower costs. Because the fixed costs of providing service can be distributed among a greater number of units, homeowners experience lower service rates than if each were to negotiate for those services on their own. Many communities in Beaver County contract with a single service provider through a competitive bidding process. Private subscription, in which residents arrange for services with the hauler of their choice, is still the most dominant form of waste collection service in the more rural areas of the County.

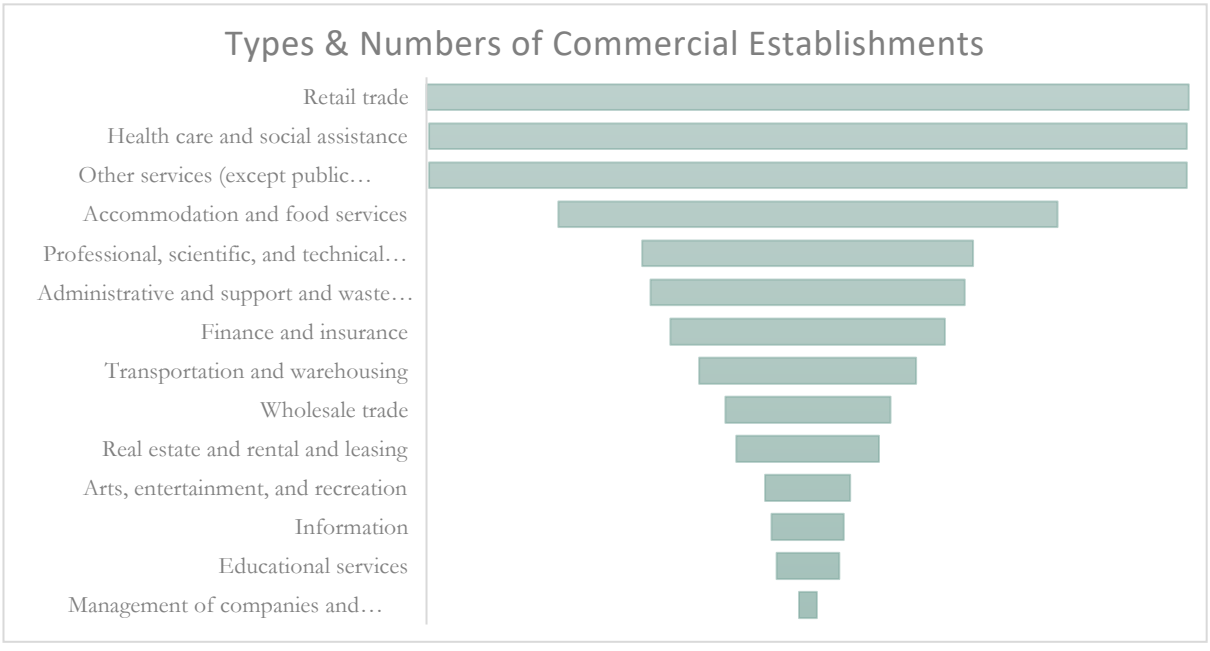
Chapter 2 provides a closer look at the available municipal solid waste infrastructure, reported collection, and disposal activity for all types of municipal waste and a variety of undesirable waste management practices.

COMMERCIAL PROFILE

The number and nature of commercial establishments within Beaver County during 2022, according to the U.S. Census Bureau, is shown in Figure 1-10. Employers in the categories of agriculture, mining, manufacturing, utilities, construction, and other industrial related operations are not considered commercial waste generators under the federal or state municipal solid waste regulations. Therefore, they have been excluded here. The retail trade represents the largest portion of these establishments, followed closely by health care and social services. The impact of tourism in Beaver County is evidenced in the high number of hospitality, food, and other service oriented categories that follow in the rankings. Each of these categories are sources of materials that lend themselves to recovery and, thus, where successful commercial recycling programs could be developed.

The differences between residential and commercial availability of services, program participation, and performance were evaluated during the planning process. The absence of universal recycling mandates and the lack of willingness to pay were discussed as factors influencing commercial recycling services. The Solid Waste Advisory Committee considered the need to promote and enforce commercial recycling participation.

FIGURE 1-10 COMMERCIAL ESTABLISHMENTS



SELECT TYPES OF COMMERCIAL MUNICIPAL WASTE GENERATORS

Aside from retailers, office buildings and other service-oriented businesses there are commercial municipal solid waste generators that are mentioned specifically by category in Act 101. Following is a brief description of each.

Government Facilities

Included in the numbers of commercial establishments are government facilities. Based on the types of government functions, these may be offices, parks and recreational venues, garages and maintenance buildings, retail outlets, and service centers. Municipal and county facilities as well as those of the state and federal government are included. Examples of government agencies that operate facilities located in Beaver County include: the US Postal Service, the PA Liquor Control Board, the Veteran's Administration Offices, the Social Security Administration, the PA State Police, state and federal legislators, and correctional facilities.

Educational Institutions

Thirteen major public school districts operated in Beaver County in 2022 with an estimated 1 thru 12 enrollment of 19,034 students. Fifteen private schools operated with an enrollment of 1,988 students. Other public learning centers also exist. The County also has three colleges.

Educational and other institutions are considered commercial waste generators. Studies have shown that schools are great sources of recyclable materials. In Chapter 4 discusses the types of materials and the quantities that could be recovered from Beaver County schools ..

Residential Care Facilities

Included in the category of commercial generators of municipal waste sometimes referred to as institutional are skilled nursing, personal care, and assisted living facilities in the County. While these facilities produce municipal waste commonly found in most residences, they also generate materials that require special handling. Due to the nature of their operations, a portion of the municipal waste generated in these facilities falls into a special category of regulated medical waste, previously known as infectious chemotherapeutic waste. These special handling wastes are discussed in the section on special handling wastes.

COMMUNITY EVENTS AND PUBLIC VENUES

Municipal waste is also generated at sporting events, fairs, festivals, and other celebrations. Attendees and vendors produce food scraps, cups, bottles, cans, flyers, boxes, etc. in varying quantities at these community events. Studies have shown that an average of 3 lbs. of waste per attendee per day can be expected for daylong events. However, no precise generation rate would apply to every event or location. Smaller events and venues may have differing quantities. The types of food, the manner in which beverages are dispensed and the volume of promotional materials also factor into the equation. Recovering recyclables and organic waste from these activities is becoming more common, and in some communities is mandated.

Some examples of the types of events in Beaver County where municipal waste is generated and where recycling could occur include a variety of community fairs, arts, crafts and food festivals, , as well as other smaller local community events, including sporting events.

In addition to event traffic, the County experiences a steady stream of visitors to its parks, stadiums, and other amusement facilities throughout the year. Therefore, it is important to consider how waste and recyclables are handled at public venues on an ongoing basis. These locations are prone to littering, particularly when waste receptacles are not readily available. Litter prevention was discussed by the Solid Waste Advisory Committee.

SOLID WASTE FROM CONSTRUCTION AND DEMOLITION ACTIVITIES

Construction and Demolition (C&D) waste is a perfect example of a waste stream that is defined and regulated as municipal waste in Pennsylvania, but viewed differently by USEPA and in other states. Construction and demolition projects in residential, commercial, and industrial establishments generate a highly variable composite waste stream. The name itself suggests the different activities that can occur depending on the specific project or job site. Work may include construction, renovation, and/or demolition and any or all of a number of related activities.

Numerous variables influence C&D waste generation and disposal rates. The amounts of C&D waste from month to month and year to year are less consistent than municipal waste as a whole. On a load-by-load basis, C&D waste can vary dramatically based on the mix of materials and physical characteristics. Demolition projects tend to generate asphalt, concrete, earth, sand, trees, steel, brick, lumber, roofing materials, flooring, plaster, dry wall, and other similar materials. Alternatively, new construction projects generally are comprised of trimmings from dry wall, framing, carpet remnants, etc. Construction and demolition projects are subject to seasonal weather conditions. Swings in the economy can stimulate or deter new development and construction. For all of these reasons, it becomes easier to understand the difficulties in projecting C&D quantities for the long term.

Two studies were recently conducted in the Northeastern United States, for the purpose of characterizing the C&D waste stream and calculating a generation rate. The first study was conducted by the Northeast Waste Management Officials' Association (NEWMOA). The Massachusetts Department of Environmental Protection commissioned the second study. When variables such as definitions of C&D and materials included were filtered, the generation rate of 0.31 tons per person per year seemed to reflect a reasonable median. Asphalt, brick, and concrete (ABC) wastes generated from road and bridge projects are not included in their generation rate calculations, as much of the material from road and bridge projects is used as clean fill on site. Trees and rocks from land clearing and grubbing were also excluded.

BEAVER COUNTY REPORTED ACTIVITY

Using the median generation rate of 0.31 tons per person per year derived from the two studies, and the 2022 population Beaver County would be expected to generate approximately 51,810 tons of C&D waste per year. Another measure to gage the amount of C&D waste generated in Beaver County is the ratio of C&D waste compared to the total amount of municipal waste disposed. According to the Pennsylvania Department of Environmental Protection, 17.5% of the material disposed in Pennsylvania landfills can be categorized as C&D waste. The average annual per capita rate in Pennsylvania is estimated to be .99 pounds per person per day.

In 2022, according to facility reports, Beaver County disposed 3,293 tons of C&D waste in Pennsylvania landfills. This represents approximately 2% of all Beaver County municipal waste reportedly disposed in Pennsylvania and Ohio. Based on Pennsylvania's average percentages, the amount of Beaver County's C&D waste reported by the landfills seems low. Considering the high rate of disposal reported for municipal solid waste from Beaver County, the extraordinarily low rate for C&D waste could further the theory that these materials are consolidated into transfer loads and reported as municipal waste. Additionally, Ohio landfills are not required to record the origins of C&D waste they receive for disposal. Given the close proximity of the Ohio landfills, coupled with their lower rates of disposal for C&D waste, it is likely that high volumes of C&D waste are disposed out-of-state. Interestingly, on a per capita basis, at an average of 1.69 pounds per person per day, Beaver County exceeds the expected norm. The deviation that exists between the low percentage of C&D waste compared to all waste reported yet with a high per capita rate for this waste stream is another indication that the reported municipal solid waste data could be inflated.

Much of the brick and concrete, and other masonry materials are utilized as clean fill, similar to the manner in which state highway projects manage this material. Contractors also reuse doors, windows, hardware, etc. in other project applications. In addition, when loads of C&D waste have some portion of municipal waste components, they are often recorded as municipal waste at the landfill.

Determining an accurate C&D waste generation rate is always difficult. However, due to significant competition in the marketplace from Ohio and West Virginia facilities, where C&D waste is not required to be reported by origin, along with the normal operational practices of transfer stations, the available data may provide a much lesser accurate account of C&D waste management than in other counties where the waste is not hauled out of state and to numerous disposal sites.

SPECIAL HANDLING MUNICIPAL WASTE STREAMS AND SOURCES

Certain types of municipal waste have properties or characteristics that require them to be managed in a different fashion or may provide opportunities for enhanced reuse or recycling. The physical nature of the waste may not be appropriate to transport in a conventional collection vehicle. The composition or amounts may present risks to those using traditional collection practices. Therefore, these categories of municipal solid waste are controlled and regulated differently.

REGULATED MEDICAL WASTE

Similar to other institutional settings hospitals and resident care facilities generate significant quantities of municipal waste. Much of the material resembles waste found in the hospitality industry, where people are temporarily housed and fed. However, due to the nature of their operations, hospitals and other health care facilities also produce waste, which is required by federal and state regulations to be treated and handled separately from other materials. This waste is identified in Pennsylvania "regulated medical waste," and is a direct result of medical procedures, treatments and other activities. Regulated medical waste generated in Beaver County is typically transported to commercial treatment facilities, although some onsite treatment remains in larger institutions. Service providers operating within Beaver County are identified in Chapter 2.

Typically, hospitals generate the bulk of the regulated medical waste, with outpatient care facilities also among the largest sources. However, with an ever-increasing aging population, a growing demand for skilled nursing and resident rehabilitation centers is anticipated. This in turn will increase the amount of waste generated in these facilities.

Figure 1-12 shows the types and number of regulated medical waste generators in Beaver County. In addition to these the County also has 4 hospitals, which are shown in Table 1-6.

FIGURE 1-12 REGULATED MEDICAL WASTE GENERATORS

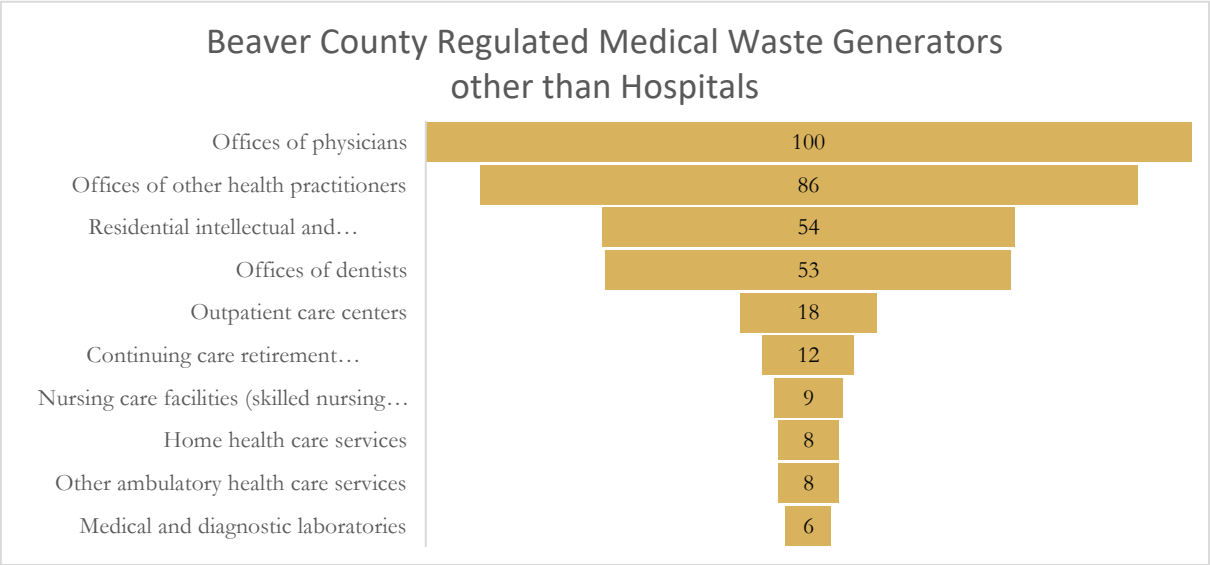


TABLE 1-6 BEAVER COUNTY HOSPITALS	
The Medical Center, Beaver	1000 Dutch Ridge Road Beaver, PA 15009
Sewickley Valley Hospital	720 Blackburn Road Sewickley, PA 15143
Kindred Hospital at Heritage Valley	1000 Dutch Ridge Road Beaver, PA 15009
UPMC/HVHS Cancer Center **The Beaver Medical Center**	1000 Dutch Ridge Road Beaver, PA 15009

SEPTAGE AND SEWAGE

Twenty-two municipal/sewer authorities service the needs of Beaver County communities. Most serve one or more municipalities or portions of municipalities.

Figure1-11 shows the network of wastewater treatment facilities and their service areas.

Where the cost of connecting sewage lines is prohibitive, on-lot septic systems must be installed by private homeowners. Septic systems must be periodically pumped by septic system service companies and the septage is either land applied or transported to a WWTP for treatment. Multi-family dwellings, such as mobile home parks and

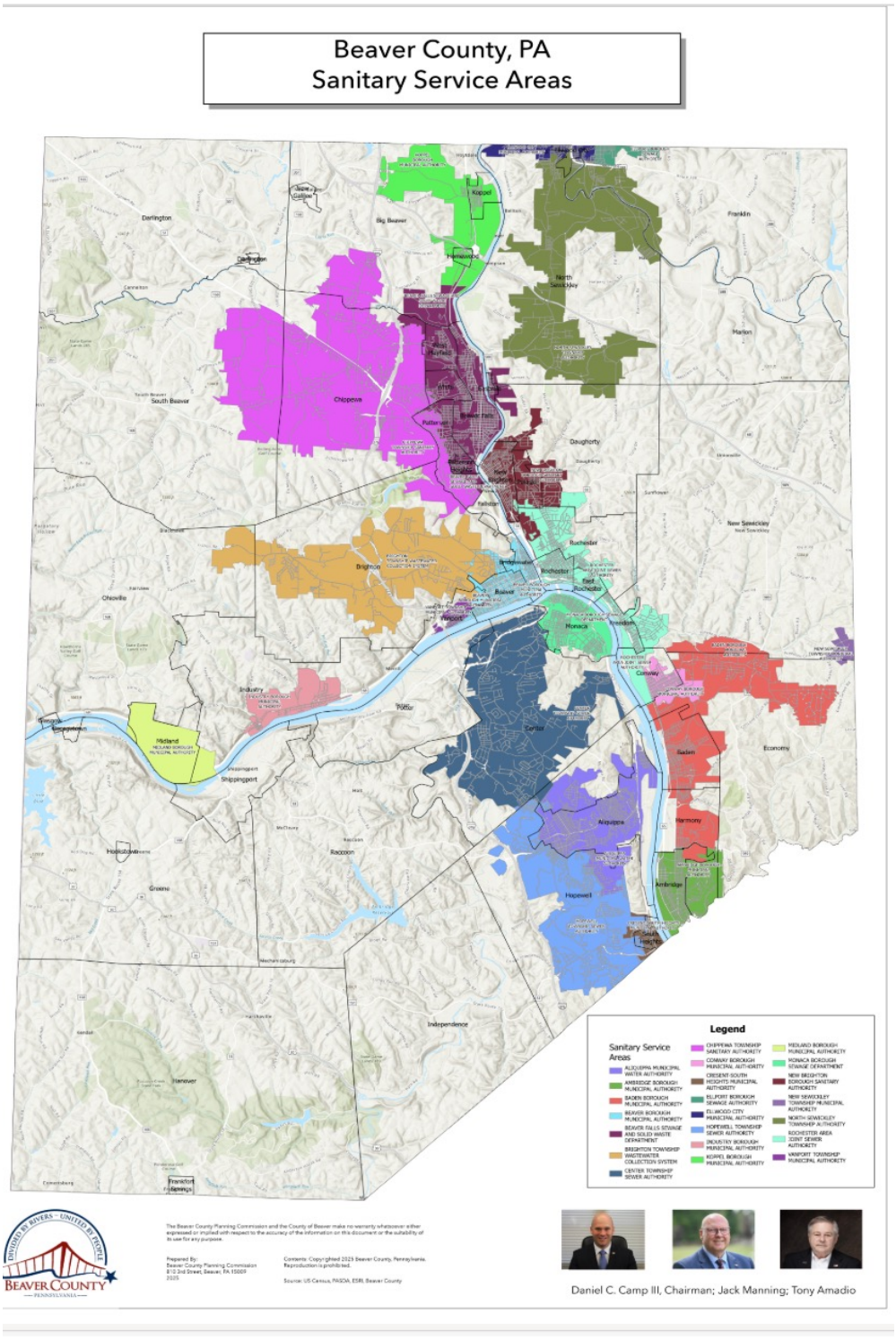
residential care facilities, as well as industrial operations may operate private pre-treatment systems, with the sewage being transported for final treatment.

Both the raw sewage and septage, which is treated at WWTP's eventually, is dewatered sufficiently to become sewage sludge. These materials require a management outlet. In Beaver County, sewage sludge is typically disposed in landfills. Overall, according to landfill reports, approximately 10,680 tons of Beaver County sewage sludge were disposed in 2022. No reporting of septage is required. Therefore, the quantities are unknown. However, the companies that transport septage within Beaver County are regulated and monitored by PADEP. Thus, it is assumed that these materials are managed adequately. These transporters along with the facilities that accept Beaver County sewage sludge for disposal are addressed in Chapter 2.

SUMMARY

The Solid Waste Advisory Committee determined that assuring proper municipal solid waste management is an important and ongoing responsibility of local governments. Their review of local data coupled with comparisons to national trends in waste management offered a sound basis to explore specific programs and services currently implemented, as well as those which may be needed in the future. The Committee recognized that failure to manage municipal waste properly not only harms the environment, but also jeopardizes public health, safety, and the overall quality of life in Beaver County. In meeting discussions, opportunities to capture specific components of the waste stream as well as enhance participation from various sectors were reinforced. Recommendations and solutions resulting from the Committee's discussion, and the findings of the planning process are provided in detail in Chapter 5.

FIGURE 1-11 NETWORK OF WASTEWATER TREATMENT FACILITIES



CHAPTER TWO

Municipal Waste Management Infrastructure

An intricate network of transporters, processors, and disposal facilities manage the municipal waste generated in Beaver County. Each plays a uniquely important role. An assessment of the availability and adequacy of services, along with the number and types of service providers included in the network is necessary to gain a realistic view of current needs and future opportunities. Although the Municipal Waste Planning, Recycling and Waste Reduction Act establishes the assurance of disposal capacity as the priority for counties, understanding these additional factors is a vital building block in the planning process. Knowing to what extent Beaver County residents and businesses use these services is another critical factor.

Chapter 2 provides an inventory of the facilities that received waste generated in Beaver County. It also examines the types of transporters that handle specific segments of the municipal waste stream, and explores disposal trends since the last planning initiative. Additionally, it considers how these trends could impact the availability of disposal capacity in the future, particularly if alternative processing methods become available. This section looks at the effectiveness of flow control and how waste is managed in local municipalities. Included is a review of the current system's strengths and weaknesses and a discussion of progress made toward decreasing undesirable disposal practices in Beaver County.

COLLECTION AND TRANSPORTATION SERVICES

At the core of all waste management programs is the ability to cost effectively move waste from the point of generation to the point of processing and disposal with the least impact on the environment.

To meet the varied demands of waste generators, different types of municipal waste collection and transportation service providers operate in Beaver County. Private and public sector service offerings may include collection from residential curbside, commercial containers, large detachable open top containers for construction, demolition, and industrial waste, and enclosed containers for food and other types of organic wastes. Special remediation projects and large demolition jobs generate enough waste to warrant the services of dump trucks or trailers. The availability of each type of service is dependent on the transporter. Larger companies have the resources to address most, if not all, collection and transportation needs.

Certain segments of the municipal waste stream must be segregated from others because they are physically and/or are characteristically difficult to handle. Specialized transportation equipment and expertise is often necessary.

REGULATING TRANSPORTATION AND COLLECTION

Tracking and monitoring collection and transportation activities is frequently used as a tool in measuring the effectiveness of local waste management programs. Transport companies that operate from locations within Beaver County are easier to identify and monitor. However, a number of others service the County from remote locations. Their movements, and thus their identities, can go undetected. Beaver County implements a registration program for all municipal waste haulers. The purpose has been to track flow control, facilitate reporting requirements, and enforce safety provisions.

While there are some benefits to managing the identity of transporters at the local level, the registration program requires greater staff time and resources than are available. Additionally, the results do not necessarily warrant the effort required to administer the program. During then planning process it was determined that the local registration system should be repealed. Supporting this decision is the existence of a state implemented program. The state's program has a greater emphasis on vehicle and driver safety, rather than providing counties and municipalities with the data necessary to evaluate their programs and fulfill their reporting requirements. Nevertheless, it still provides the County with a method to identify transporters operating within its boundaries. The following section outlines the state's requirements.

TRANSPORTER AUTHORIZATION

In Pennsylvania, certain transporters of municipal and residual waste must obtain Waste Transporter Authorization. Since 2002, all waste transportation vehicles (trucks and truck tractors with a registered gross vehicle weight greater than 17,000 lbs., and trailers with a registered gross vehicle weight greater than 10,000 lbs.) transporting municipal or residual waste to processing or disposal facilities in Pennsylvania have been regulated by the Waste Transportation Safety Act (Act 90). Haulers that transport waste to out of state facilities are not required to obtain authorization. Self-haulers and haulers of small quantities of waste are exempt from the license also.

Authorization is not limited to only those who collect municipal waste from residences and businesses. Those who haul construction demolition debris and significant

quantities of materials from their own operations also meet the criteria. Therefore, commercial businesses, builders, developers, roofers and remodeling contractors can fall into this category. Because they control a significant and important portion of the municipal waste stream, their practices must be considered in policies that result from the planning process.

The numerous entities who handle municipal waste in Beaver County can be found in the state's database of authorizations at this link.

http://cedatareporting.pa.gov/Reportserver/Pages/ReportViewer.aspx?/Public/DEP/WM/SSRS/Waste_Trans_Safety_Auths

During the Plan's implementation, transporters will change. The authorizations listed are generally active, but the status may lapse, be revoked, or voluntarily withdrawn at any time. PADEP updates the transporter authorization list on a daily basis.

TRANSPORTING SPECIAL HANDLING MUNICIPAL SOLID WASTE

A certain portion of the municipal solid waste generated within Beaver County requires specialized methods of transporting, processing, and disposal. These wastes are not typically hauled directly to landfills. In Pennsylvania, transporters of special handling wastes are licensed and regulated separately from the Act 90 Waste Transporter Authorization Program. Often customized equipment is used to deliver these wastes to treatment or pretreatment facilities specifically designed for their management. In some instances, wastes are actually conveyed directly to the facility via pipelines and pumping stations. Special handling wastes include: biosolids, septage, sludges resulting from treated wastewater, and regulated medical wastes.

MANAGEMENT OF BIOSOLIDS AND RESIDENTIAL SEPTAGE

As evidenced in Chapter one an extensive network of twenty-two wastewater treatment systems exists throughout Beaver County. Wastewater from residences and businesses flows through pipelines to the treatment facilities. As would be expected, this network services the more densely populated areas of Beaver County. The development of such an infrastructure is often cost prohibitive in rural areas where the housing density is low. Rather than flow wastewater to a remote treatment facility, it is held in a septic tank and periodically emptied by a septage transporter. Residential septage can be managed in one of two approved methods. The first option is to transport the septage to a municipal or private wastewater treatment facility or a septage treatment facility where it can be properly treated prior to final disposal. Because facilities within a reasonable driving distance may not be permitted to accept septage, this is not always a viable option. An alternative then is to obtain approval for beneficial use of the septage by land application at an agricultural or reclamation site.

SEPTAGE TRANSPORTERS

In Pennsylvania, transporters of residential septage must register with the PADEP. The transporter records information for each load of septage collected and transported. Required information includes, at a minimum: the county and state where the waste was collected; the name and address of the hauler transporting the septage; the name and location of the transfer, processing, or disposal facility where the septage has been or will be delivered; the weight or volume of the septage; and, a description of any handling problems or emergency disposal activities. Although a report is not filed, the information must be made available upon request to PADEP inspectors.

Septage cleanouts are done on a periodic as needed basis. The typical recommended schedule is once every three years, provided the system was designed with adequate capacity to deal with the flow and the system performs as expected. Homeowners contact the transporter of their choice for this service. Since homeowners manage their own septic systems it is difficult for Beaver County municipalities to know if each is maintained in accordance with the local municipal sewage management plan.

Since homeowners without public sewer services manage their own septic systems it is difficult for these Beaver County municipalities to know if each is maintained in accordance with the local municipal sewage management plan.

It is common for transporters to cross county lines to provide such services. The PADEP can only identify haulers based on their origin, not on their service area. Therefore, many counties also require septage transporters to register their intent to operate within the county. Beaver County does not currently regulate septage haulers through a registration program.

The septage transporters known to offer services within Beaver County can be found in the state's database. The system is searchable by name, location, and zip code.

https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Ffiles.dep.state.pa.us%2FWater%2FBiosolids%2FBiosolidsPortalFiles%2FActive_Septic_Hauler_Registration-April_2024.xlsx&wdOrigin=BROWSELINK

REGULATED MEDICAL WASTE MANAGEMENT

Transporters of regulated medical waste (formerly known as infectious chemotherapeutic waste) also fall within the ranks of those requiring a license in Pennsylvania. A stipulation of the license is that each transporter must report the origin

and ultimate destination of the waste to PADEP. The County does not have any regulatory powers related to medical waste. Most companies operate within a wide service area, if not the entire state; therefore, due to contractual arrangements that continually change, it is impossible to accurately show which companies operate within Beaver County.

The state maintains a list of licensed regulated medical waste transporters at the following link.

http://cedatareporting.pa.gov/Reportserver/Pages/ReportViewer.aspx?/Public/DEP/WM/SSRS/ICW_Transporters

RESIDENTIAL COLLECTION PATTERNS AND TRENDS

Waste collection services are available throughout Beaver County. Local requirements and service offerings vary from town to town. Several municipalities secure collection services for their residents through a competitive bidding process. In those communities, a contractual agreement provides one hauler with the exclusive rights to collect residential waste for a fixed period of time. A few others participate in the marketplace by providing collection services utilizing public employees and equipment. In contrast to the contracted municipalities and those publicly serviced, the remainder of Beaver County has a voluntary waste collection subscription system. In subscription service areas, residents, commercial, and institutional establishments are free to contract directly with the hauler of their choice. From a waste collection perspective, some Beaver County municipalities have no requirements for residents. As a result of cleaning out a basement or attic, remodeling, or doing yard work, we all encounter extra volumes of waste periodically. It is not unusual from time to time for homeowners and small businesses to haul waste which they generated to a disposal outlet. Beaver County has two transfer facilities which accept waste from homeowners and small businesses as well as from commercial transporters.

An issue often ignored where participation is voluntary is that residents and businesses are also free to have no service at all, fostering the opportunity for undesirable disposal practices.

Historically, evidence shows an unwillingness to pay plays a great role in the avoidance of waste collection service. This happens to a lesser degree where affordable self-haul opportunities are available. Nevertheless, it is a situation worth monitoring.

PROCESSING AND DISPOSAL SERVICES

The core of a municipal solid waste management plan ensuring adequate resources are available for the collection, transportation, and disposition of the various waste streams. In addition, the plan must review and assess the management practices of the residents and businesses that generate the waste. This section focuses on the broad infrastructure of the disposal/processing facilities that meet Beaver County's municipal waste management needs. It also describes the legal and regulatory framework under which the County selected facilities for capacity assurances.

FLOW CONTROL OF MUNICIPAL WASTE

The control of the waste commodity, specifically where it can be disposed, is a power offered to local jurisdictions. Flow control is a hotly debated issue in the waste industry. Opponents claim it interferes with free trade and interstate commerce. Supporters view it as a simple tool to ensure proper management and funding of their overall solid waste programs. A series of federal and state court rulings have consistently supported this authority, when implemented under specific circumstances.

The discussions and arguments commonly reference the following rulings:

- Article I, Section 8, Clause 3 of the U.S. Constitution (the "Dormant" Commerce Clause)
- Pike v. Bruce Church, Inc., 397 U.S. 137 (1970)Harvey & Harvey v. Chester County, 68 F.3d 788 (3d Cir. 1995)
- C&A Carbone, Inc. v. Town of Clarkstown, New York, 511 U.S. 383 (1994)
- United Haulers Association Inc. v. Oneida-Herkimer Solid Waste Management Authority, 127 S.Ct. 1786 (2007)

FLOW CONTROL CRITERIA

The conditions or tests under which flow control has been considered acceptable or unacceptable include, but are not limited to;

- Whether or not there will be interference with interstate commerce;
- If the benefits of using a public facility outweigh the exclusion of other facilities;
- To what degree other factors may affect the legitimacy of those benefits;
- If the procurement and selection process was fair, open and competitive ;
- The process by which a request for ancillary support for a county's programs is conducted.

In Pennsylvania, flow control measures can also be influenced by Act 101 and case law which places constraints on the relationship between capacity assurances, landfills designated to accept a county's waste, and measures in a solicitation for capacity requesting financial or in-kind services to support county recycling programs.

The most recent of these rulings is Waste Management of Pennsylvania Inc V. Commonwealth Department Of Environmental Protection (2015).

The ruling concluded that Act 101 prohibits the unilateral imposition of a fee on a disposal facility as part of the criteria for executing a capacity contract and thus being designated in the county plan. However, the court also ruled that a request for voluntary support of a county's recycling program through some tangible means proposed by the facility was allowable. In other words, the facility could volunteer a financial donation, but likewise, it might prefer to provide collection services, equipment, or some other support whose value could be monetized.

Strict Flow Control

Limits disposal to one facility which is typically publicly owned

Modified Flow Control

Referred to as a Menu Plan

Disposal limited to facilities guaranteeing capacity via a contract

No Flow Control

Referred to as an Open Plan

Must still obtain guarantees for capacity

Disposal is not limited to the sites with contracts

Waste can be disposed at any permitted facility

TYPES OF FLOW CONTROL

In a straightforward interpretation and enforcement of flow control, governmental laws or policies require waste materials to be disposed at one designated disposal facility. This is known as strict flow control. Typically, this occurs when the government entity has assumed full responsibility for waste management and has a vested interest (ownership and/or operation) in a landfill, transfer station, or waste to energy facility. It is also allowable when one public entity directs the waste from its jurisdiction to a facility owned by another public sector entity.

Other forms of flow control are also allowable, even when the local public entity has no stake in the operation. When contractual arrangements are obtained through a fair, open, and competitive procurement process, waste disposal may be restricted to designated third party facilities, public or private sector. This modified form of flow control is often referred to as a menu plan because waste can be disposed at one nor more of the facilities which executed disposal capacity agreements with the county.
Some counties opt to have no flow control at all. Although they must still secure disposal capacity, waste from the county may be disposed at any permitted facility regardless of whether the site executed a capacity agreement with that county or not.

BEAVER COUNTY'S APPROACH

To meet its obligation to provide sufficient disposal capacity for the municipal waste generated, the County examined a number of options in the development of the 1990 Beaver County Municipal Solid Waste Management Plan. Stakeholder engagement, a public comment period, and public outreach to local municipalities during the planning process ensured that public and private interests had an opportunity to voice opinions and concerns or offer support. The County also conducted a legal review of Act 101 and other applicable federal and state laws and court rulings.

Based on the findings of the analysis, waste flow control has been an integral part of the original Beaver County Municipal Solid Waste Management Plan, and each iteration thereafter. The policy was instituted by County Ordinance 082092 which was repealed and replaced with County Ordinance #102716-ORD. This ordinance provides the necessary legal mechanism that establishes the authority of the County and/or its agents to implement and enforce the goals and objectives set forth in the Plan. During the planning process, a review of the current ordinance revealed some inconsistencies with current regulatory criteria. Additionally, it was determined that the transporter registration program was cumbersome to enforce and administer given the County's minimal staffing and resources.

A copy of the ordinance amended to repeal transporter registration and some minor inconsistencies with current regulatory criteria is provided in Appendix D.

DESIGNATED DISPOSAL AND PROCESSING FACILITIES IN 2015 PLAN

Beaver County exercised its flow control powers by directing municipal waste generated within its boundaries to numerous publicly traded and privately owned and operated landfills. Only one of the landfills is located in Beaver County. The remainder are located throughout southwestern Pennsylvania, the panhandle of West Virginia, and eastern Ohio. Together the facilities provided more than sufficient available permitted capacity for the projected term of the Plan. In addition, their proximity provided the most convenient, cost effective, and environmentally sound option for assured disposal capacity. Each of the landfills executed a disposal capacity agreement with Beaver County which included a sustainability fee payable quarterly to support the County's programs.

County Ordinance #102716-ORD requires all municipal waste generated in Beaver County and acceptable for disposal under the operational criteria must be delivered to one or more of the sites which executed disposal capacity agreements with the County and, thus, are designated within the Beaver County Municipal Solid Waste Management Plan. The Plan was adopted by the Board of County Commissioners and approved by PADEP.

FIGURE 2-4 BEAVER COUNTY DESIGNATED DISPOSAL FACILITIES 2015-2025

Figure 2-4 lists the companies and the sites they operate that were designated to accept Beaver County municipal solid waste for disposal from 2015 -2025.

DISPOSAL ACTIVITY

When given the proper mechanisms and resources, planning prompts us to look at futuristic scenarios to deal with a number of municipal waste issues. To get there, we review historic data in terms of indicators that may point to notable trends and changes. This exercise can help to identify flaws in our previous assumptions and adjust our programs accordingly moving forward.

The need to secure sufficient disposal capacity is the primary goal for counties under the provisions of Act 101. Knowing the amounts and disposal destinations of municipal waste originating in Beaver County can confirm or question the adequacy of the current disposal infrastructure. It can also point to opportunities for future alternative facility development.

REPORTED DATA

The USEPA generally defines municipal waste as the day-to-day waste we generate in our homes and in commercial and institutional establishments. Pennsylvania differs somewhat from the USEPA definition by including construction and demolition waste, medical waste, ash and sewage sludge under that umbrella. Since Pennsylvania landfills and resource recovery facilities report these municipal waste categories separately, it is easy to see changes and fluctuations in any one of them.

IMPACT OF RESIDUAL WASTE

In addition to the waste from homes and businesses, Pennsylvania facilities also report the quantities of disposed waste resulting from industrial and manufacturing operations. Counties do not have jurisdiction over this industrial residual waste. However, because it is disposed in the same facilities utilized for municipal waste management, it is important to understand the impact it can have on the disposal capacity available to Beaver County. There are a number of key factors that influence the extent to which residual waste is a major issue in the municipal waste planning process. Since residual waste is the "residue" remaining from industrial processes, the types of local industries directly determine the types of materials in the residual waste stream. For instance, a steel mill will generate greater quantities and types of waste than a small tool & die manufacturer. Unlike municipal solid waste, which is affected by population, economic conditions directly contribute to the quantity of waste generated and disposed. Obviously, one would expect more waste to be generated when manufacturing production increases. Aside from economic conditions, because wastes from remediation and oil and gas exploration are considered residual waste, the quantities are subject to rapid fluctuations due to the nature of these projects. These fluctuations present lucrative opportunities for disposal, sites and therefore, can consume the capacity normally available to local governments on any given day. Compared to the residual waste generated in Beaver County during the height of steel production, industrial sources currently dispose much less waste. In the graphic and the table all types of municipal waste and all types of residual waste were combined to derive the totals for each category. The data reflects the totals adjusted for out-of-state facilities and the influence of transfer station operations. A more detailed look at the individual components of municipal solid waste and residual waste is provided in Chapter 3.

Figure 2-5 illustrates the difference in quantities of residual and municipal waste.

FIGURE 2-5 COMPARISON OF BEAVER COUNTY RESIDUAL WASTE AND MUNICIPAL WASTE DISPOSAL

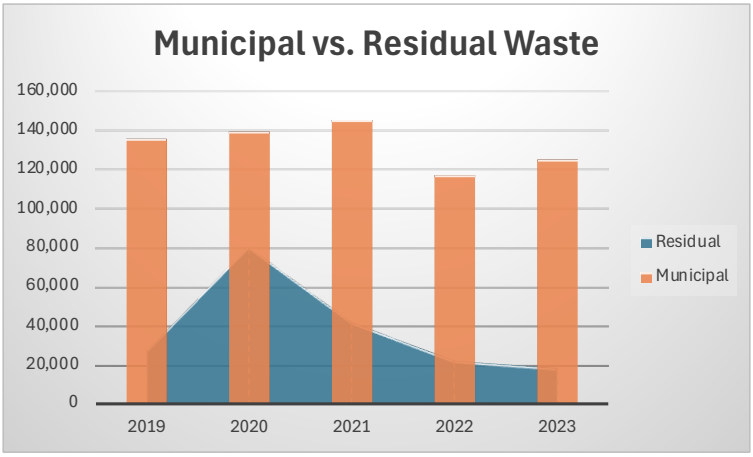


Table 2-6 shows the trends in the amounts of and locations where the residual and combined municipal waste streams are disposed. The graduated colored bars in the table indicate the top five disposal sites for each waste stream within each year.

TABLE 2-6 DISPOSAL TRENDS RESIDUAL AND MUNICIPAL WASTE

Facility	2019 Total Residual	2019 Total MSW	2020 Total Residual	2020Total MSW	2021 Total Residual	2021 Total MSW	2022 Total Residual	2022 Total MSW	2023 Total Residual	2023 Total MSW
Arden	4,218	19,516	1,921	20,429	602	21,629	4,821	6,309	1820.4	15,249
Brooke	0	7	0	82	0	8	0	37	0	6
Brunner	6,745	30,978	6,325	29,938	6,353	26,740	8,087	26,247	6,166.30	27,057
Carbon Limestone	0	526	0	12	0	440	0	371	0	710.4
Chestnut Valley	0	0	0	2	0	4	0	0	0	0
Clinton County	28	0	0	0	0	0	1	1	24.1	0
Greenridge	0	0	431	0	0	9	0	0	0	0
Imperial	9,580	12,376	9,627	15,016	2,033	12,660	8,035	9,404	8982	14,231
Mahoning	0	21,525	0	18,496	0	26,451	0	24,274	0	19682
Monroeville	15	111	133	12	33	320	44	645	43.5	455
Northwest	0	12	38	159	0	66	0	165	0	20
Seneca	1,453	50,743	2,388	54,860	1,750	56,694	1,101	49,375	1194.57	47382
South Hills	0	0	0	10	0	0	0	22	0	0
Southern Alleghenies	0	0	0	0	0	2	0	0	0	0
Valley	5,145	0	59,151	16	30,906	2	0	0	1.5	0
Westmoreland	0	0	0	0	0	76	28	2	1.5	0
	27,183	135,793	80,014	139,032	41,677	145,100	22,117	116,850	18,234	124,792

Figures 2-6 and 2-7 narrow the number of sites to those which regularly accept the greatest quantities of Beaver County waste for disposal.

Figure 2-6 illustrates the trends in municipal solid waste disposal. It's easy to see that the pattern varies minimally from year to year. Because the County implements a menu flow control program with the ability to choose from a number of designated sites, logistics and costs dictate the ultimate disposal destination for each hauler. Changes in the successful bidders for municipal collection contracts are often the variable in the

slight shifts seen on the graph since many of the landfills are vertically integrated with hauling services.

FIGURE 2-6 TOP MUNICIPAL SOLID WASTE DISPOSAL DESTINATIONS

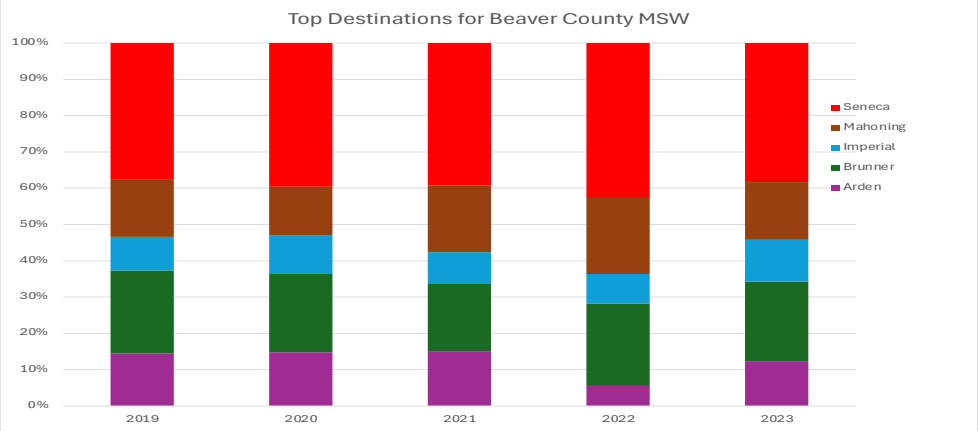
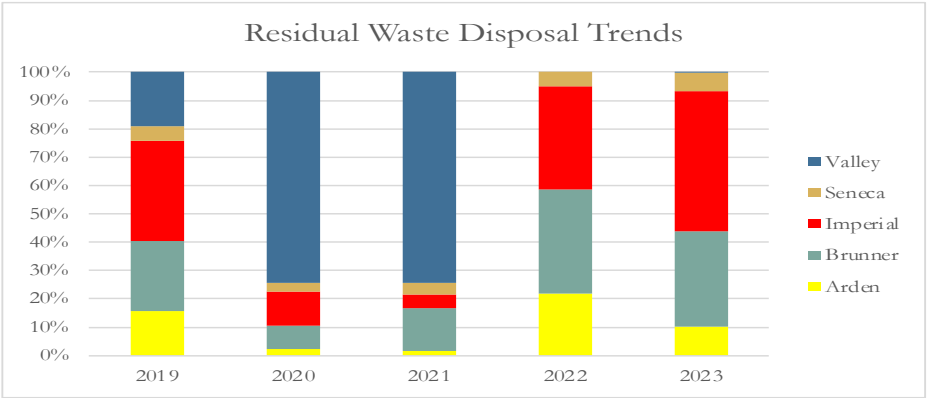


Figure 2-7 shows the trends in residual waste disposal. The chart demonstrates that residual waste fluctuates more so than municipal solid waste by destination. Although industrial waste ebbs and flows with then economy, generators aren't prone to change disposal facilities often. The major fluctuations shown in the graph are due more to oil and gas drill cuttings and other remediation projects, which generate short term but large quantities of materials,

FIGURE 2-7 TOP RESIUDAL WASTE DISPOSAL DESTINATIONS



LOGISTICAL CONCERNS

The impact collection and transportation have on the cost of managing municipal waste is often overshadowed by disposal in discussions. However, labor, fuel, and equipment represent a significant portion of the cost of waste management. When time and distance can be reduced, transportation costs can be controlled.

To achieve this, municipal waste, which is collected in smaller vehicles designed to maneuver residential streets and commercial roadways, is sometimes delivered to an interim processing facility known as a transfer station. There, it is consolidated, compacted, and loaded into large trailers, and in some instances rail cars, to be transferred to the ultimate disposal destination. Both have the ability to hold larger volumes and weights of materials per trip than the collection vehicles. This reduces the number of trips and, thus, costs.

Although transfer stations are associated with hauls of at least 50 to 100 miles or more, sometimes they can serve a local purpose. Urban areas often use transfer stations to reduce the number of collection vehicles needed to service a town. Because the collection vehicles can unload quicker at a local transfer station than if they delivered the waste the whole way to a landfill when fully loaded, the time saved enables each truck to service more homes per day.

Transfer stations are also considered processing operations because materials that can be recycled or processed for beneficial use are often salvaged from inbound loads of municipal waste. In addition, processes that reduce the volume of bulky materials such as construction & demolition waste, are common to reduce the number of hauls for disposal.

Transfer stations that operate in Beaver County serve one or more of these purposes. Just like transporters that haul directly, the transfer stations are required to deliver all municipal waste, including construction & demolition waste that has not been recycled, to one of the designated disposal facilities in the Plan.

Table 2-7 shows a list of those transfer stations. It includes the facility's PADEP issued identification number, as well as the physical address.

Unloading Waste from Local Collection Routes


Salvaging material for Recycling and Beneficial Use


Waste Consolidated into Trailers and Transfered to Landfill

TABLE 2-7 TRANSFER STATIONS THAT SALVAGE AND/OR CONSOLIDATE AND TRANSPORT BEAVER COUNTY WASTE

Transfer Stations Located in Beaver County				
Operator	Facility	Municipality	Permit #	Facility and Address
Vogel Holding	Valley Waste Service	Chippewa	696104	Wallace Run Road Beaver falls, PA 15010
Waste Management	Ambridge Transfer Station	Ambridge	243289	E.22nd St. and Oak Alley Ambridge, PA 15003

TRENDS IN TYPES AND QUANTITIES OF WASTE DISPOSED

To compare the annual disposal data for Beaver County from 2019 through 2023, the facility reports from Pennsylvania landfills submitted to PADEP were utilized. This data was adjusted for known discrepancies based on transfer operations and out-of-state sites. The discrepancies were identified based on reports submitted directly to Beaver County as a requirement of the capacity assurance agreements. The review showed that overall, Beaver County is disposing less municipal solid waste currently than in the past. This is consistent with what would be anticipated considering the decline in population during the same timeframe.

From 2019 to 2023, residual waste fluctuated wildly from year to year rather than in clearly defined or progressive increases or decreases. Such variations are expected based on how residual waste is generated. The amount of sewage sludge reported also fluctuates from year to year, but not as dramatically as residual waste. The changes are typically reliant on when a treatment plant disposes of the sludge it generates. It is normal for that schedule to change depending on the size of the plant and the storage capacity. For smaller plants sludge can be in storage until there is a sufficient quantity to warrant transport. Therefore, the quantities may overlap from year to year.

When compared to similar population bases, on a percentage of all municipal waste disposed, construction demolition quantities remain low overall throughout the period reviewed. There is one exception. In 2021, the amount of construction demolition waste increased significantly. This was due in part from the COVID phenomenon which saw homebound residents initiate more DIY projects and attic/basement cleanouts than normal. Additionally, during this time Beaver County hosted one of the largest construction projects in the nation with the Shell Cracker Plant. This peak year artificially skews upward the average annual amount of construction demolition waste reportedly disposed. Unlike the percentage comparison, on a per capita basis construction demolition waste, the reported data is somewhat higher than the national average. Unlike municipal waste as defined by the USEPA, these other waste streams traditionally are more sensitive to seasonal and operational influences, so from a planning perspective the average annual deviations are not indicative of any significant trends that could affect disposal needs.

POPULATION AS AN INDICATOR OF WASTE DISPOSAL

The reported population data is informative at face value. Even more interesting is the raw data compared to other relevant Beaver County statistics. Population has always been considered a driver of municipal waste generation and disposal. In fact, in the last half of the twentieth century, the per capita waste generation rate exceeded the population growth rate. Considering Beaver County has experienced a population decline it would be natural to assume that waste disposal would decrease as well. However, Beaver County's reported data indicates that it mirrors the same phenomenon seen nationwide.

Beginning in approximately 2004, the amount of waste we generate and dispose per person began a slow decline and recently stabilized to the similar level of performance seen in 1990. The most recent data from the USEPA indicates we dispose of roughly 2.89 pounds of municipal waste per person per day. Studies show that for construction and demolition waste the landfill disposal rate in areas like Pennsylvania is approximately 0.99 pounds per person per day. There is no guideline for residual waste. Because lean manufacturing can produce more products with less waste using less labor, industry is no longer reliant on a large-scale local workforce. Therefore, residual waste has no direct relationship to population or gross sales and it is excluded in the comparison here.

Beaver County disposes of municipal waste in much greater quantities per person than areas with similar demographics.

Although Beaver County follows the national trends for declining waste disposal on an annual basis, Table 2-7 shows that compared to the national statistics, Beaver County disposes of municipal waste in much greater quantities per person than areas with similar demographics. The same is true to a lesser extent for construction and demolition waste. There are no standards for sewage sludge, but they are included here to demonstrate the local trend.

A number of reasons could contribute to the slight variations from the national performance rates for disposal. The first simple explanation is that averages are derived from the mid-range of data that is somewhat higher and also from data that is somewhat lower. Both must exist to produce the "norm." Due to the convenience and affordability of disposal within the region, along with the proximity of transfer stations within the County, it is possible that waste from outside the County filters into the reported data.

Much like the disposal data, Beaver County has a higher than average reported recovery rate. It is likely that Beaver County's recycling drop-off collection program attracts

recyclable commodities generated by residents from other counties. Additionally, many municipalities offer curbside recycling collection.

The combination of higher than average disposal coupled with higher than average recovery results in a generation rate that exceeds the national norm. The averages per capita disposal rates shown in Table 2-7 will be used in Chapter 3 to calculate Beaver County's projected disposal capacity needs. It should be noted that the average per capita rates were derived using the average population and the average disposal quantities. In other words, they are not an average of each year's per capita rates. The only similarity is for MSW because municipal solid waste generation/disposal is directly related to population, while sewage sludge and construction demolition waste generation/disposal is not. To use the average of the per capita rates for these waste stream would significantly skew the rates upward and provide an artificially inflated result.

TABLE 2-7 DISPOSAL AND POPULATION TRENDS

Population Compared to Reported Waste Disposal with Out of State & Transfer Station Adjustments

		Tons per year			Pounds per person per day		
Year	Population	MSW	Sewage Sludge	C&D	MSW	Sewage Sludge	C&D
2019	163,956	122,931.0	9,622.1	3,040.7	4.11	0.43	1.73
2020	167,860	125,317.0	10,225.9	3,471.6	4.09	0.45	1.86
2021	166,914	133,361.0	9,506.7	8,648.0	4.38	0.39	4.98
2022	167,629	117,012.0	10,680.3	3,293.1	3.82	0.50	1.69
2023	165,631	108,792.0	14,242.9	1,767.7	3.60	0.72	0.68
Annual Average	**166,398**	**121,482.6**	**10,855.6**	**4,044.2**	**4.00**	**0.36**	**0.13**

ILLEGAL DUMP SITES

Between 2003 and 2013, Keep Pennsylvania Beautiful systematically surveyed and cataloged the location and characteristics of the illegal dumpsites in Pennsylvania counties. The sixty-seventh and final survey was conducted in 2013. At the conclusion of the study, no county in Pennsylvania was found to be without a certain number of sites, including Beaver County.

Because the methodology utilized allowed for the subjectivity of the surveyor, Keep Pennsylvania Beautiful's results are far from scientific, and thus the validity of the illegal dumping surveys are often debated by the county in question. Therefore, it is likely that some specific conditions may be viewed differently depending on the personal experience, opinions, and interpretation of the individual. Addition ally, it is likely that

many of the sites once identified in Beaver County have been remediated. Unfortunately, it is equally likely that others have appeared.

Nevertheless, discussions of the Solid Waste Advisory Committee confirmed that illegal dumping remains an ongoing issue in the County. The lack of sufficient numbers of volunteers along with the high cost of remediating dump sites, estimated at more than $700 per ton, have decreased the clean-up activities within Beaver County.

COMMENTS AND OBSERVATIONS ON BEAVER COUNTY'S DISPOSAL PRACTICES

The Beaver County has ensured that convenient and affordable disposal outlets and collection services are available for a wide variety of discarded materials. The enactment and active enforcement of the Ordinance # 102716-ORD has provided the proper support for the responsible transportation of municipal solid waste throughout the County.

By committing to a system of flow control, the County accepted full responsibility and control for the municipal waste generated within its borders. Overall, the modified system of flow control has been successful. Documented disposal activity provides a strong indication that the municipal and residual waste streams are managed responsibly. The growth and expansion of a wide array of collection services for all types of specialty wastes has eliminated the potential for serious environmental problems due to mismanagement of these materials.

There has never been a formal study conducted to quantify the actual number of Beaver County homes and businesses with or without a waste collection service provider. The County should continue to promote the expansion of organized municipal curbside collection programs whenever possible along with ordinances for waste storage and mandatory collection of municipal waste. Not only would this ensure proper waste management, but it could significantly reduce the cost of collection services to local residents.

More detailed and specific recommendations for Beaver County, along with a timeline for implementation, are outlined in Chapter 5.

CHAPTER THREE

Projecting Future Disposal and Processing Needs

The preceding chapters provide an overview of Beaver County's demographic profile with emphasis on issues related to implementation and costs of municipal solid waste management programs and services. Historic waste generation and disposal data is presented with analysis and commentary. Key indicators and trends in waste characterization and composition are established. Anomalies are identified including potential causes. Together these facts and findings serve as the foundation upon which decisions in this planning process are made.

Chapter 3 uses the data and established trends to projects Beaver County's waste generation and disposal requirement for the next decade. It compares it to the rate at which capacity is being consumed at landfills currently receiving the County's waste. Factors, which could influence the availability of landfill capacity to the County, and alternative methods of disposal and processing are considered. Finally, the mechanisms and justifications for future disposal capacity assurance are discussed in relationship to any legal and regulatory criteria governing those decisions.

MUNICIPAL SOLID WASTE MANAGEMENT PLANNING IN PENNSYLVANIA

The intent and purpose of regulatory requirements can be easier to understand when viewed in the context and circumstances at the time when they were adopted. A good example is the chain of events in the years immediately prior to and following the enactment of the Municipal Waste Planning, Recycling, and Waste Reduction Act (Act 101 of 1988).

The conditions in the waste industry in 1988 were dramatically different from those in 2015. During this period, more stringent federal and state landfill regulations were introduced. The costs of permitting, engineering design and construction as well as bonding for post closure care proved prohibitive for small private facilities and local municipal dumps. Many of these landfills closed. The USEPA had targeted 5,000 sites for the first wave of closures. In Pennsylvania alone, more than 1400 landfills were about to disappear. Some sold to larger conglomerates intent on internalizing the disposal of waste, which was collected by their hauling divisions.

The closures created a sense of crisis throughout the environmental and regulatory community. Although fewer, the remaining state-of-the-art disposal facilities were larger with three to four times the previously available regional disposal capacity. In a state of transition and uncertainty those facts were overlooked due to perceived corporate monopolization of the remaining landfill capacity. To complicate matters, the USEPA reported that since 1960 the per capita rate of municipal waste generation was

increasing faster than population growth. Fears prevailed that in short time the nation would have no place to dispose of the ever-increasing municipal waste stream.

For those reasons, Act 101 specifies that securing long-term disposal capacity is the top priority for Pennsylvania counties during the development of a municipal solid waste management plan. Act 101 also places mandates for recycling on the municipalities to decrease the capacity demand by diverting waste material from disposal.

Counties are required to update their plans approximately every ten years. Alternatively, counties must revisit their plans at the time when the disposal capacity in facilities that they own and/or operate is diminishing or within three years of the expiration of contractual arrangements for capacity with outside entities.

Beaver County utilized a contractual agreement in the 2015 Plan Update as the legal mechanism to secure primary and back-up capacity, depending on the facility. The current agreements will expire beginning in 2026. Therefore, initiating the current Plan Update is a timely exercise. Doing it in conjunction with an exploration of disposal and processing options which may not have been available previously makes sense.

CURRENT CONDITIONS

Beaver County has been disposing less and less municipal waste over the last decade. The decreases are consistent with a declining g population. Throughout the region, that tendency is prevalent in other counties. It also mirrors national trends. In some cases, the decrease in tonnage has been dramatic.

In addition to changes in population, the loss of tons disposed in some respects is due to the growth of recycling and composting. The diversion of those materials, which otherwise would have been landfill bound, accounts for only a portion of the discrepancy in what was previously reported and the current statistics. Other contributing factors to decreased waste generation by weight overall, are changes in packaging and efficiencies in manufacturing consumer goods. Lighter materials and design improvements have significantly altered the products that we purchase. Therefore, what is disposed weighs much less. The downside of these alterations is that the lighter weight material is frequently greater in volume and more difficult to condense. Therefore, it can consume more physical capacity in a landfill.

ISSUES THAT AFFECT AVAILABLE CAPACITY

A review of the existing permitted disposal capacity in the western Pennsylvania, Ohio, and West Virginia vicinity shows that the overall regional supply of landfill space currently exceeds the need for disposal in that same geography. Unless some dramatic

changes in the flow of waste into this region occur, it seems safe to expect conditions to remain that way for an extended period.

On a site-specific basis, the results differ from the regional capacity outlook. At face value, the acreage, elevations, and permitted daily volumes of specific landfills may not accurately reflect the actual airspace that is remaining in a facility. A number of factors determine whether or not a facility is able to optimize the capacity that could be made available at that location.

PERMIT STATUS

Although a number of facilities have the potential to make prolonged capacity available through vertical and/or horizontal expansions, the development of those areas is dependent on PADEP approval of permit modifications. Regulatory changes and constraints, permitting moratoriums, prevailing public policy and attitudes can hamper or halt permit modifications and renewals. If approvals cannot be obtained in a timely manner, or worse, not at all, then capacity thought available could decrease. The region has also lost some landfills due to closures.

SITE CONDITIONS AND OPERATIONAL PRACTICES

A number of operational practices such as compaction ratios; density of material received; poor use of daily cover material; and unforeseen construction difficulties can decrease the space available for disposal. Every site is designed to accommodate the terrain, previous land use, exclusionary criteria, and proximity to contiguous properties. Local zoning and the terms and conditions of host municipality agreements also play a role.

BUSINESS DECISIONS

Changes in ownership are common in the waste industry. Integrated companies that own hauling operations prefer to internalize disposal at their own facilities. It is not uncommon to see waste redirected to facilities, which were obtained in mergers and acquisitions. Such shifts can accelerate the consumption of capacity. Increases in permitted volumes due to windfall contracts, catastrophic events, economic conditions, or company policies can also have an impact. Currently, corporate decisions are resulting in some landfills closing prematurely. Although these sites have permitted capacity, the volume of material delivered to the sites does not warrant continued operation when profitability is considered. Therefore, where multiple sites operate under the same corporate entity, select sites are being closed to funnel the same amount of material into fewer facilities. The reduction in labor and operating costs is a profitable move.

COMPETING WASTE STREAMS AND SOURCES

Disposal/processing facilities that serve Beaver County also accept other types of materials besides municipal waste. Manufacturing and process waste, or residual waste, is one of the most common. Currently, residual waste represents a small percent of Beaver County's total waste disposed. However, drilling activity in the Marcellus Shale Gas Formation resulted in massive volumes of drill cuttings disposed in landfills within Pennsylvania. Although the activity is not as prevalent as it was several years ago, new initiatives within the energy industry could change that scenario. Continued acceptance of this material at the pace previously witnessed would accelerate the use of the excess capacity that currently exists in regional landfills. This could displace municipal waste from surrounding areas into the facilities that serve Beaver County. Having multiple designated sites as Beaver County has in the past could prevent any concerns.

In addition to residual waste streams, other counties and states utilize the facilities for municipal waste disposal/processing thus competing for capacity with Beaver County. The counties which send some amount of municipal waste to the sites commonly used for disposal of Beaver County waste include, Allegheny, Butler, Lawrence, Washington, Westmoreland, and Greene.

CATASTROPHES AND EMERGENCIES

Catastrophic events at the disposal site could unexpectedly prevent a facility from operating. Natural disasters, which create large volumes of debris could also impact the amount of space available for the County's municipal waste. The by-pass facilities can serve an important function in either of these situations.

PROJECTED LANDFILL CAPACITY REQUIREMENTS

The estimated future disposal capacity required for Beaver County is based on current reported disposal quantities. Data was compiled from state facility reports and adjusted based on data reported directly to the County from out-of-state facilities. Other modifications were made to reconcile inconsistencies caused by transfer station operations. Projections are based on a five year average of the population and the five year per capita averages from the modified data. The adjusted information is shown in Chapter 2 Table 2-7. It should be noted that the projections for construction demolition waste are thought to be skewed significantly upward due to a one time major industrial construction project in the County. Nevertheless, the PADEP requires the data to be averaged. The projections are conservative enough to allow for possible future changes in the rate of municipal waste generated per capita, and any changes in the recovery rate of recyclable materials.

POPULATION

Future population estimates were derived from assumptions made the Pennsylvania State Data Center. The Pennsylvania State Data Center calculated the population for the County in five-year increments. To demonstrate disposal capacity needs on an annual basis it was necessary to determine the projected population for the years from 2026 to 2030 and from 2031 to 2035. The missing annual populations were extrapolated by using the data Center's assumptions for the five-year growth.

Table 3-1 shows the projected population for Beaver County for the period of the 2025 Plan Update.

TABLE 3-1 BEAVER COUNTY POPULATION PROJECTIONS: 2025-2035

Projected Changes in Beaver County Population		
2025	2030	2035
166,577	164,741	162,245
	1.1%	1.52%
Source: Pennsylvania State Data Center		

DETERMINING THE FUTURE MUNICIPAL WASTE DISPOSAL RATE

The USEPA reports on national MSW generation and disposal rates. In recent years, the generation rate per capita has been about 0.89 tons per person per year with little variation. Likewise, the disposal rate has hovered near 0.52 tons per person per year. Thus, for projection purposes, it was assumed that per capita disposal rates will remain unchanged in Beaver County.

Table 3-2 presents the total projected population for Beaver County. It also shows the projected disposal capacity requirements for the years 2026 through 2035. The figures are based on a constant per capita disposal rate with adjustments due to projected population changes.

TABLE 3-2 DISPOSAL CAPACITY PROJECTIONS

Beaver County Projected Disposal capacity Requirement 2026-2035

	Population	MSW	Sewage Sludge	Construction Demolition
2026	166,210	121,333	10,920	3,943
2027	165,844	121,066	10,896	3,935
2028	165,479	120,800	10,872	3,926
2029	165,114	120,533	10,848	3,917
2030	164,741	120,261	10,823	3,908
2031	164,247	119,900	10,791	3,897
2032	163,754	119,540	10,759	3,885
2033	163,263	119,182	10,726	3,873
2034	162,773	118,824	10,694	3,862
2035	162,245	118,439	10,659	3,849

SOLICITATION FOR DISPOSAL AND PROCESSING CAPACITY

The pending expiration of the capacity agreements from 2016 along with the potential impact of one or more of the issues presented in this chapter, justifies a need to seek out and secure disposal capacity for Beaver County for the next decade. The PADEP was notified of the County's intent to solicit proposals from interested disposal and processing facilities. A formal request was posted in the Pennsylvania Bulletin and was advertised in Waste Advantage Magazine, a national industry trade journal. A copy of the published notification is provided in Appendix C. A copy of the Request for Proposals, which includes the disposal capacity agreement is provided in Appendix D. The evaluation of then proposals can be found in Appendix E. Results of the procurement process are provided in Chapter 6.