

This document was authored in 2004. For the latest information on the County's Solid Waste Management Plan, please review the 2015 – 2035 update.



Chapter

2

Projections and Waste Quantities

Description of Fairfax County's Current Solid Waste Stream and Projections for the Next 20 Years

This chapter describes Fairfax County's current waste stream characteristics, estimates of waste quantities and material types, and projections of the waste stream over the next 20 years. It also examines the pertinent demographic data, including population, urban concentration, households, and employment, and county characteristics, including climate, geology, and traffic conditions, that may influence waste collection, waste disposal, and type of materials disposed of over the next 20 years.

SWMP projections include the Cities of Fairfax and Falls Church, and the Towns of Vienna, Clifton, and Herndon.

For the SWMP, demographic data include the Cities of Fairfax and Falls Church, and the Towns of Vienna, Clifton, and Herndon. Although these cities and towns are not part of the county's planning district, the county will continue to handle their wastes over the SWMP planning period. Therefore, the county considers them within its "service area."

Description of Plan Area

County Characteristics

The County of Fairfax comprises approximately 395 square miles (252,828 acres) in northern Virginia and spans roughly 25 miles from north to south as well as east to west. The county borders the State of Maryland to the north, Arlington County and the City of Alexandria to the east, Loudoun County to the west, and Prince William County to the south. The Occoquan River defines the southern border and the Potomac River the border on the north and east. The county includes the Towns of Vienna, Clifton, and Herndon. Near the center of the county is the City of Fairfax; the City of Falls Church is located on the eastern border with Arlington County.

Fairfax County is further subdivided into nine magisterial districts: Braddock, Dranesville, Hunter Mill, Lee, Mason, Mount Vernon, Providence, Springfield, and Sully. Figure 2-1 shows their locations.

Figure 2-1. Map of Fairfax County Magisterial Districts



Geographic Conditions

Located in both the Piedmont and Coastal Plain physiographic provinces, the county is characterized by gently rolling terrain. The western quarter of the county (up to the border of Loudoun County) lies in the Lowland Province of the Piedmont; the central area lies in the Piedmont's Upland Province. The eastern part of the county is located in the Coastal Plain.

The topography of the region is tied to the physiographic provinces. In general, the upland areas of the county are gently rolling and are bounded by steep bluffs and incised drainages. Wetlands are frequently found adjacent to the bluffs in the floodplains of the rivers and streams of the county. Large tidal and non-tidal wetlands typically are located in the southeastern portion of the county. The highest natural elevation in the county is Tysons Corner at 573 feet above sea level. The lowest point is at the confluence of the Occoquan and Potomac Rivers in the southeastern part of the county.

The soils present in the county are also related to the physiographic provinces. The soils in the Piedmont are shallow and, during periods of low rainfall, are susceptible to drought conditions. The soils of the Coastal Plain are variable but tend to be gravelly with low permeability.

The climate of the region is characterized by four distinct seasons, with spring and fall typically cool and moist. Summers tend to be hot and humid, with an average temperature of 82°F. Winters are characterized by mild weather, with temperatures near freezing, punctuated with periods of cold temperatures and heavy snowfall. The normal annual precipitation for the area is 39 inches. The average growing season is from April 20 to October 20.

The vegetation of the region is characterized by a blend of deciduous trees, predominantly of the oak family, and conifers, primarily pines. The vegetation in the area ranges from small herbaceous plants and wildflowers to shrubs and trees.

Transportation Conditions

Northern Virginia, including Fairfax County, is the third worst congested traffic area in the nation, in terms of percentage of congested roadways and time spent in traffic.¹ Of the lane miles in the region, 44 percent are rated “F” or worst for congestion. Northern Virginia residents spend an average of 46 hours a year stuck in traffic.



Northern Virginia is the third worst congested traffic area in the nation. Traffic is forecasted to worsen over the next 20 years.

The impact of increased truck traffic and congestion will need to be addressed in selecting solid waste management alternatives.

Traffic conditions factor significantly into the development of the county’s SWMP. As the traffic conditions worsen, the time and cost of collection and disposal methods will increase. The county will need to address the impact of increased truck traffic and congestion in selecting future solid waste management (SWM) alternatives.

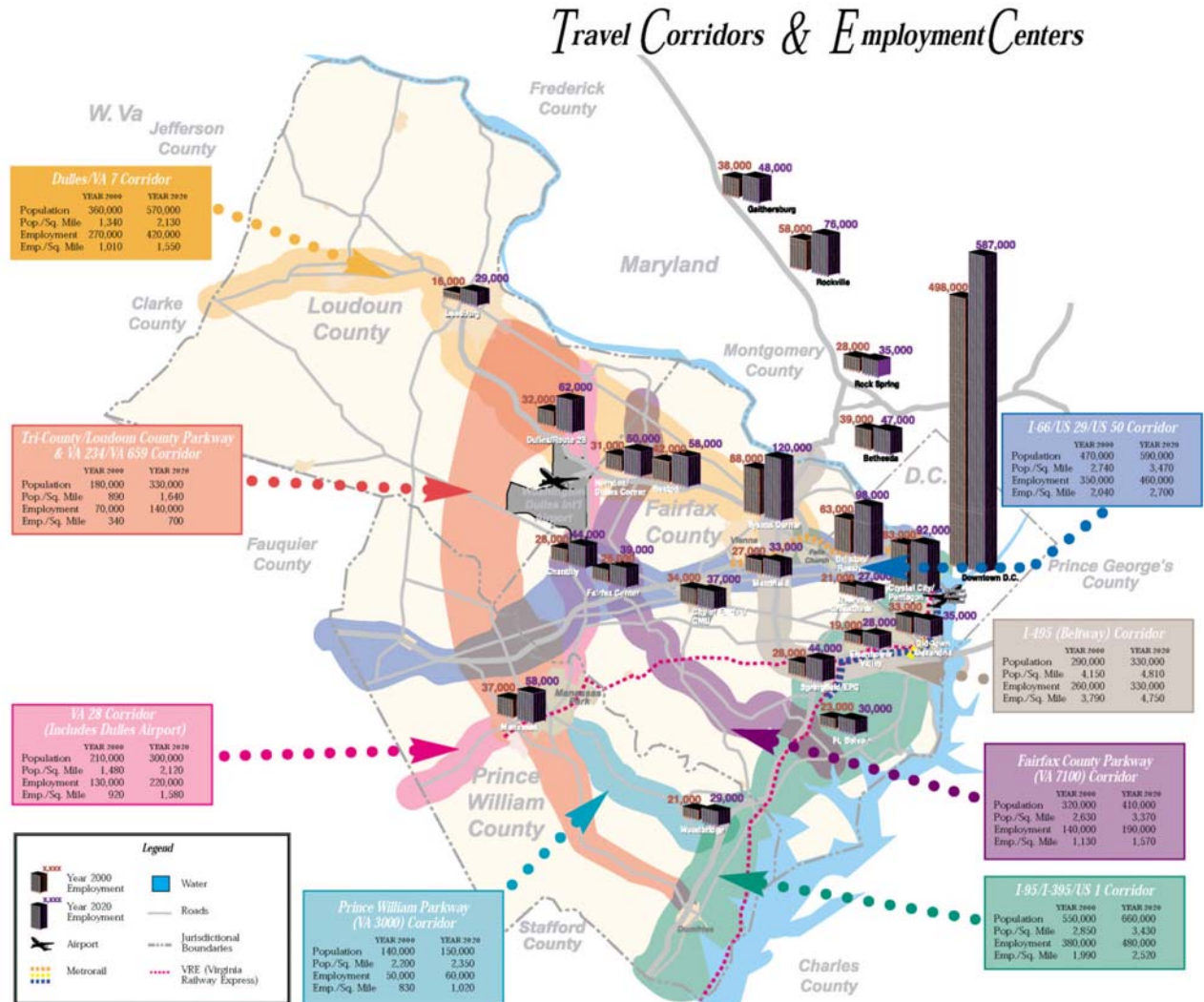
The forecast over the next 20 years is that traffic conditions will worsen. By 2025, the county expects vehicle miles traveled to increase 41 percent, while the planned lane miles will increase by only 13 percent.

Figure 2-2 shows the traffic corridors and employment centers in northern Virginia. All the traffic corridors have significant traffic congestion issues. To make matters worse, the Virginia Department of Transportation predicts that the I-66, I-95, Herndon/Dulles, VA 28, and US 1 corridors, in

¹ David Schrank and Tim Lomax, *The 2002 Urban Mobility Report*, Texas Transportation Institute, June 2002.

particular, will experience significant growth in traffic congestion over the next 20 years.

Figure 2-2. Travel Corridors and Employment Centers in Northern Virginia



Source: Virginia Department of Transportation, *Northern Virginia 2020 Transportation Plan*, Dec. 1999.

Population Data and Projections

Population

Fairfax County is the most populous jurisdiction in both Virginia and the Washington metropolitan area.

Fairfax County is the most populous jurisdiction in both Virginia and the Washington metropolitan area. From 1970 to 1980, the county's population increased from 454,275 to 596,901, roughly 31 percent. The population increase from 1980 to 1990 was even greater, a rise of 37 percent, to 818,584 residents. Population growth decreased to 18.5 percent over the next decade, to 969,749 residents in 2000. The Fairfax County Department of Systems Management for Human Services estimates that the total county population in January 2001 was 984,366.

Table 2-1 presents Fairfax County’s population in 2001 by magisterial district.

Table 2-1. 2001 Fairfax County Population by Magisterial District

Magisterial district	Population
Braddock	106,484
Dranesville ^a	104,148
Hunter Mill ^b	118,977
Lee	100,270
Mason	103,736
Mount Vernon	114,256
Providence	110,995
Springfield ^c	116,025
Sully	109,475
Total	984,366

Source: Fairfax County Department of Systems Management for Human Services, 2001.

^a Includes the Town of Herndon.

^b Includes the Town of Vienna.

^c Includes the Town of Clifton.

The population will grow over the next 20 years, but at diminishing rates.



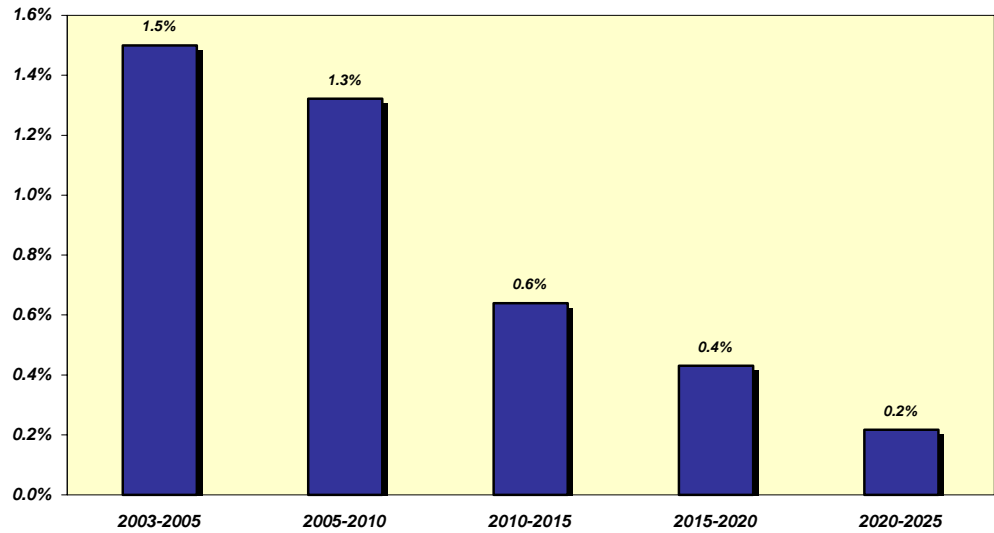
Population Forecasts

Fairfax County’s expects the population in its service area to grow over the SWMP planning period, but at diminishing rates. Figure 2-3 shows the county’s estimated annual growth rates through 2025, and Figure 2-4 shows its projected population through 2025.

The county projects population growth to be greatest in the current less-developed areas, as the trend of county urbanization continues. Increased population and new households will likely result in increased generation of municipal solid waste (MSW) and construction/demolition/debris (CDD) wastes.

Appendix A contains additional information concerning the trends in population growth and households.

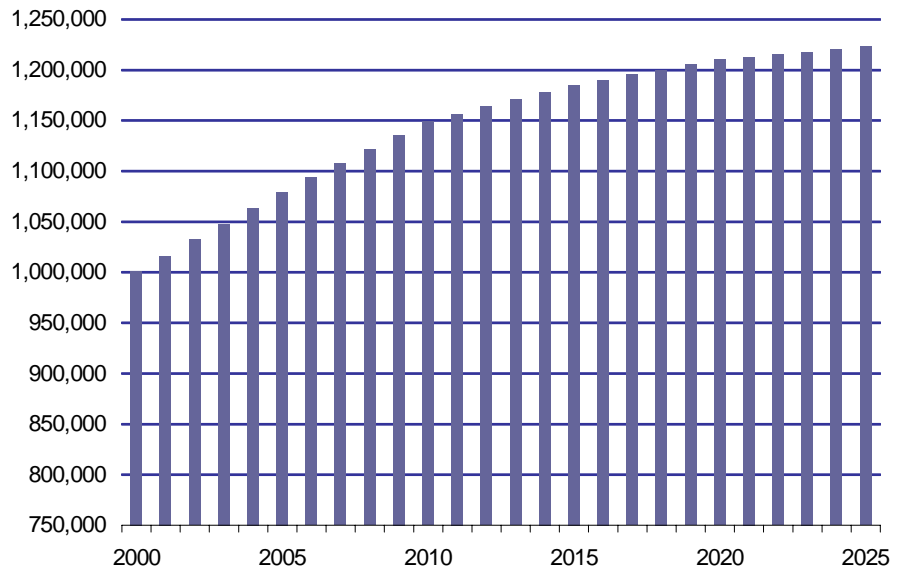
Figure 2-3. Fairfax County Service Area Annual Population Growth, Projected 2003–2025



Note: Includes the Towns of Vienna, Clifton, and Herndon and Cities of Fairfax and Falls Church.
 Source: Fairfax County Department of Systems Management for Human Services, 2001.

Figure 2-4. Fairfax County Service Area Total Population, Projected 2000–2025

Fairfax County projects that its population will grow to 1,220,000 (an increase of more than 200,000) over the next 20 years.



Note: Includes the Towns of Vienna, Clifton, and Herndon and Cities of Fairfax and Falls Church.
 Source: Fairfax County Department of Systems Management for Human Services, 2001.

Fairfax County's population density is 2,455 persons per square mile, classifying it as "very dense urban."

Urban Concentrations

The U.S. Census Bureau calculated that Fairfax County's population density in 2000 was 2,455 persons per square mile (or 3.8 persons per acre). This density classifies the county as very dense urban, close to the average U.S. central city population density of 2,716 persons per square mile. In contrast, the 2000 population density was 80 persons per square mile in the United States and 179 persons per square mile in Virginia.



Table 2-2 compares Fairfax County's population density with its bordering counties.

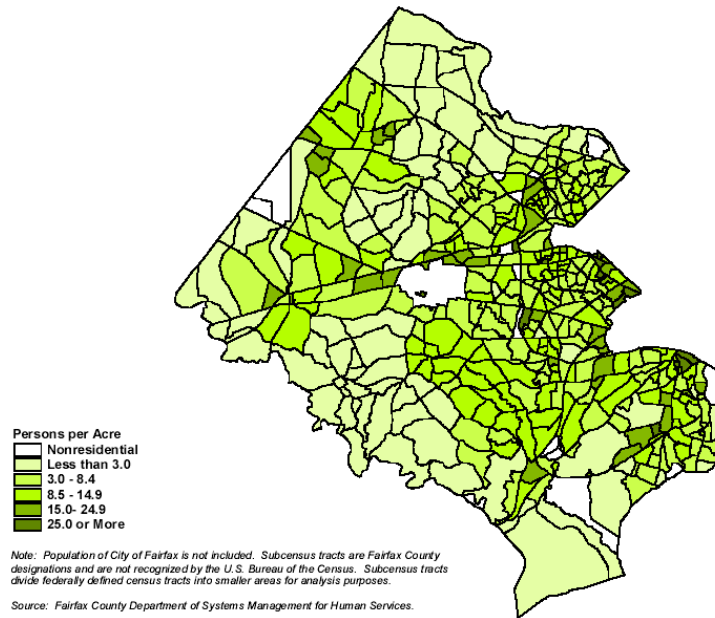
Table 2-2. Population Densities of Bordering Counties

Bordering county	Population density (persons/mi ²)
Arlington	7,323
Loudoun	326
Montgomery	1,763
Prince William	831
Fairfax County	2,455

The Fairfax County population is denser in the areas closer to Washington, DC.

Over the past 30 years, development has extended from inside the Capital Beltway (Interstate 495) to the west and south to provide, in part, needed housing for the expanding population. As a result, Fairfax County's population is denser in the areas closer to Washington, DC. Additional population concentrations are along the Interstate 66 and Dulles Toll Road (Virginia Route A-267) corridors. Figure 2-5 shows the county's population density by sub-census plot.

Figure 2-5. Fairfax County Population Density, 2002



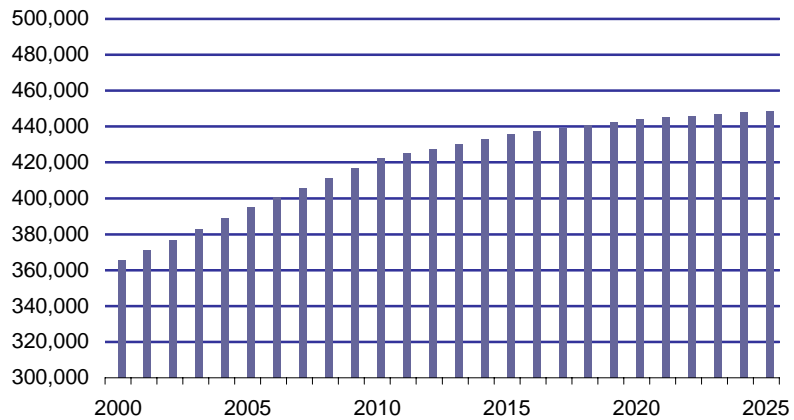
Fairfax County projects that its households will grow by more than 75,000 over the next 20 years.

Household Forecasts

In 2000, Fairfax County counted 353,100 households within its borders. The City of Fairfax counted 8,035 households, and the City of Falls Church counted 4,471 households. The county projects that the number of households will increase through 2025 at roughly the same annual rate as the population (discussed above). Figure 2-6 shows the county’s estimate of total households through 2025.



Figure 2-6. Fairfax County Total Households, Projected 2000–2025



Note: Includes the Towns of Vienna, Clifton, and Herndon and Cities of Fairfax and Falls Church.
Sources: Fairfax County Department of Systems Management for Human Services, 2001 Metropolitan Washington Council of Governments, Round 6.2 Cooperative Intermediate Forecasts.

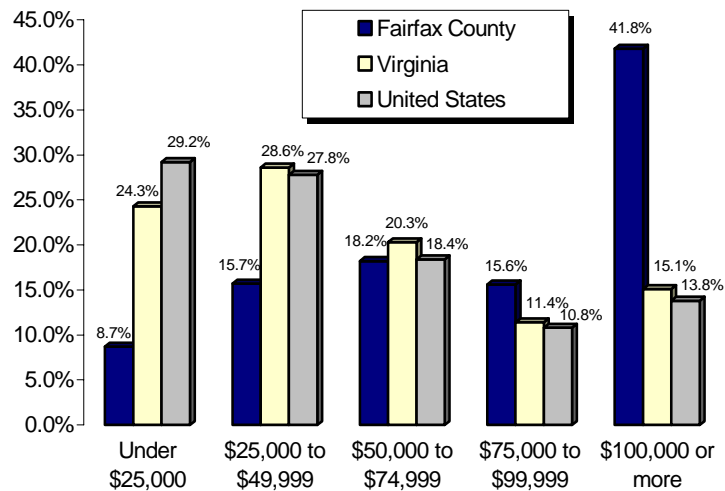
In 2000, the average household size in Fairfax County was 2.71 persons.

In the U.S. Census 2000, the average household size in Fairfax County was 2.71 persons, larger than the national average of 2.59 and Virginia average of 2.54.

Household Income Distribution

Fairfax County is one of the wealthiest counties in the country. The county’s 2001 median household income of \$84,683 is more than twice that of the United States (\$42,228) and 73 percent more than that of Virginia (\$49,085). Figure 2-7 shows the distribution of incomes in Fairfax County and the United States in 2001.

Figure 2-7. Fairfax County and U.S. Income Distribution, 2001



Source: U.S. Census Bureau.

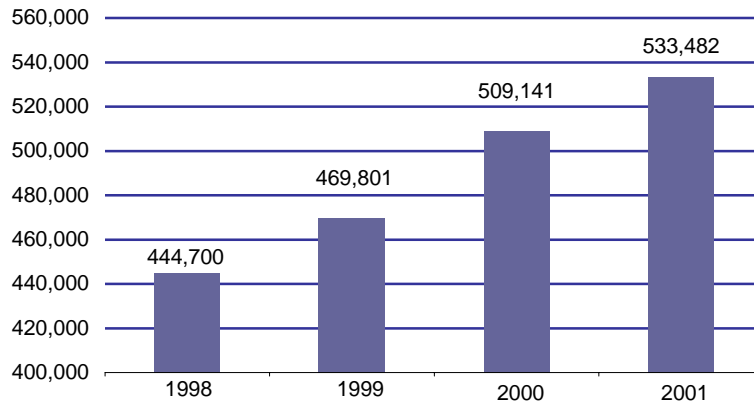
Employment

Fairfax County is a major employment center; employment growth has recently accelerated rapidly.



Fairfax County is home to an extensive commercial office market and is a major employment center. In 2001, more than 25,800 establishments in the county employed more than 533,400 people. Employment growth in the county has accelerated rapidly between 1998 and 2001, as shown in Figure 2-8.

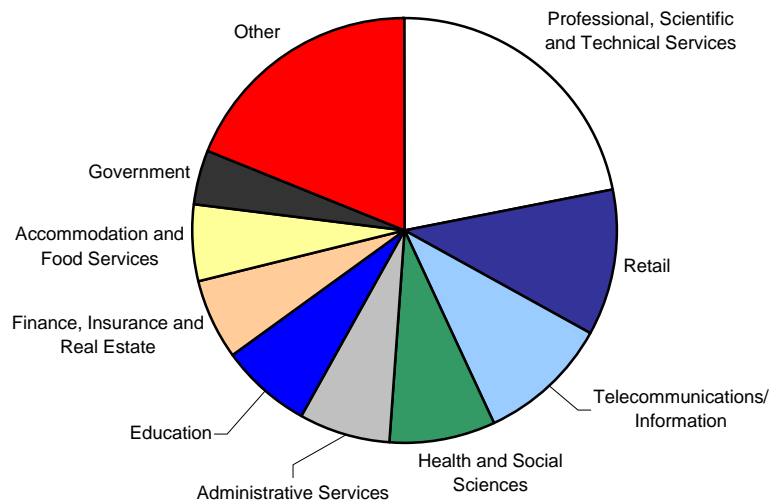
Figure 2-8. Fairfax County Employment, 1998–2001



Source: U.S. Census Bureau County Business Patterns.

Fairfax County’s workforce is both highly trained and educated. The major businesses in the county consist of government, defense, information technology, software, Internet, e-commerce, telecommunications, and aerospace firms. Employers within the county include corporate and regional headquarters, government contractors, trade and professional associations, retail firms, wholesale distributors, and business and financial services. Figure 2-9 shows a breakdown of employment in Fairfax County by industry.

Figure 2-9. Employment in Fairfax County by Industry



Source: Virginia Employment Commission, 2001.

Within the county, businesses range from small entrepreneurial startups to multi-billion dollar enterprises. The county hosts six Fortune 500

headquarters, more than 230 foreign-owned firms, and more than 4,000 technology firms. The majority of businesses in the county, however, are small and locally owned; 97 percent employ fewer than 100 employees or post revenues under \$1 million.

The employment characteristics of the Cities of Fairfax and Falls Church are similar to Fairfax County. In 2000, the number of jobs in the City of Fairfax was 30,800 and in the City of Falls Church 9,400.

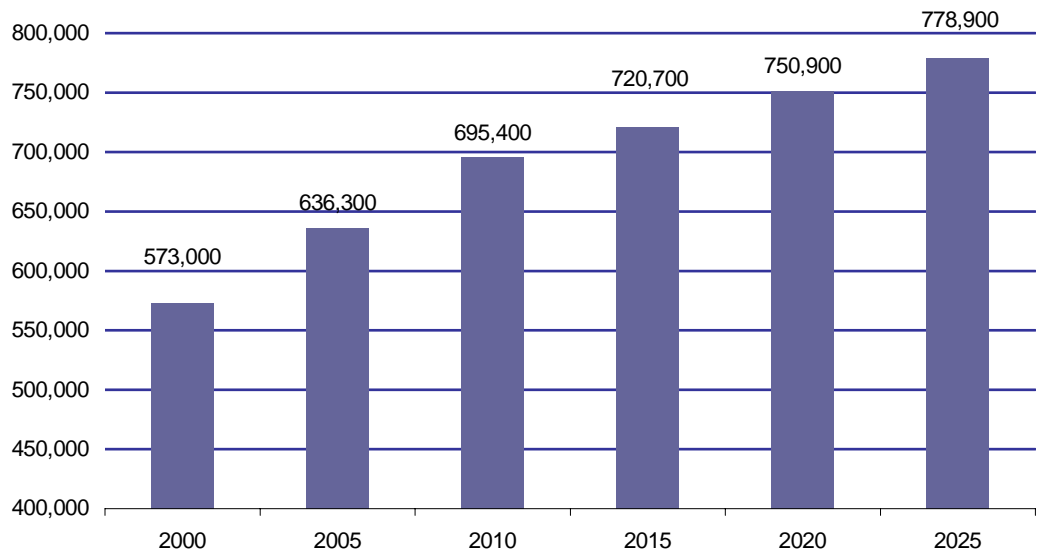
Since the county predicts employment growth to outpace population growth, commercial waste will likely increase as a percentage of the total waste stream.

Employment Forecasts

The Metropolitan Washington Council of Governments (MWCOC) expects employment in Fairfax County to grow over 38 percent between 2000 and 2025. Therefore, employment is predicted to outpace the growth of population in the county (22 percent) over the same period. As a result, Fairfax County will likely experience an increase in commercial waste as a percentage of the total MSW stream over the next 20 years.

Employment growth in the cities is expected to be much less than the overall growth for Fairfax County. Employment in the City of Fairfax is projected to increase by 6 percent and in the City of Falls Church by 3 percent from 2000 to 2025. Figure 2-10 shows the employment projections for the Fairfax County service area from 2000 to 2025.

Figure 2-10. Fairfax County Employment Projections, 2000–2025



Source: Metropolitan Washington Council of Governments, Round 6.3 Cooperative Intermediate Forecast, 3/03

Composition of Solid Waste

MSW

MSW includes rubbish, trash, and garbage produced by households, apartment buildings, hotels, motels, businesses, industry, and institutions.



The MSW stream's plastic component has been increasing and the paper component decreasing over the last five years.

Waste Generation Activities

MSW includes solid waste generated by residential, commercial, industrial, and institutional establishments. This includes rubbish, trash, and garbage produced by households, apartment buildings, hotels and motels, and businesses, including offices, stores, restaurants, and institutions such as schools and hospitals. Fairfax County does not track waste receipts based on residential, commercial, industrial, or institutional origin; therefore, the plan used data representing the combined MSW stream to develop the future projections in this section. The MSW totals *include* yard wastes and certain special wastes described further in this chapter, such as used oil, antifreeze, tires, batteries, and household hazardous waste (HHW).

Waste Stream Material Types

1990 Municipal Waste Composition Study Data

In 1990, the county studied its municipal waste composition to estimate the percentages of specific material types in the waste stream. It categorized 100 representative samples during August and November and manually sorted them into 35 refuse categories. The study determined that 76 percent of the MSW stream in the county is made up of paper (44 percent) and organics (32 percent), including yard waste. The remainder of the waste stream includes plastic (9 percent), glass (6 percent), and metals (6 percent). Appendix B shows the results of the study.

2000 EPA National Municipal Waste Composition Data

With the increase of plastics over the last decade, the 1990 waste characterization data does not accurately represent the county's current waste stream. The best available characterization data for the county's current waste stream is the recent national solid waste composition data in the U.S. Environmental Protection Agency (EPA) biennial survey report *Municipal Solid Waste in the United States: 2000 Facts and Figures*. (Table 2-3 shows the waste composition characterization from this study.)

Table 2-3 also presents the 1995 EPA data to illustrate the changing composition of MSW. The MSW stream's plastic component has been increasing over the last five years (10.7 compared with 8.9 percent), while the paper component has been decreasing (37.4 compared with 38.6 percent).

Table 2-3. Fairfax County Waste Stream Composition (%)

Category	2000 EPA mean	1995 EPA mean
Paper	37.4	38.6
Plastic	10.7	8.9
Yard waste	12.0	14.0
Organics	23.4	21.6
Glass	5.5	6.1
Aluminum	1.4	1.4
Ferrous metals	5.8	5.5
Misc. Inorganics	1.5	1.5
Other waste	1.7	1.7

Source: EPA, 2002.

Paper and organics (lumber, textiles, diapers, food waste, etc.) represent the largest components of MSW

Residential and Commercial Waste Percentages

The county estimates that residential sources generate 45 percent and commercial sources (businesses, institutions, and industries) generate 55 percent of the waste stream.

Fairfax County estimates that 45 percent of its current MSW stream is generated by residential sources and 55 percent is generated by commercial sources, including businesses, institutions and industries. Wastes generated by these sources have similar components:

Residential. Single- and multi-family homes.	Newspapers, clothing, disposable tableware, food packaging, cans and bottles, food scraps, and yard trimmings
Commercial. Office buildings, retail and wholesale establishments, and restaurants.	Corrugated boxes, food wastes, office papers, disposable tableware, paper napkins, yard trimmings
Institutional. Schools, libraries, hospitals, and prisons.	Cafeteria and restroom trashcan wastes, office papers, classroom wastes, and yard trimmings
Industrial. Packaging and administrative (not process wastes).	Corrugated boxes, plastic film, wood pallets, lunchroom wastes, and office papers



The average county MSW generation over the last three years is 6.30 pounds per capita per day.

These statistics correlate well with national waste percentages; for example, the national EPA survey estimates that in 2000, the breakdown of MSW generation was 55 to 65 percent from residential sources and 35 to 45 percent from commercial. A recent study by MWCOC found that 46 percent of MSW disposed of in the Washington area (which includes Fairfax County) was generated by residences and 54 percent by commercial sources.

Waste Generation Rates

Fairfax County compiled its data from county weight scale records and recycling reports for 2000, 2001, and 2002 to determine the county MSW per capita generation rate (including the cities and towns) for each year (see Table 2-4). The county calculated the total waste generation by adding the county waste disposed of and recycling totals for each year. The average county waste generation over the last three years is 6.30 pounds per capita per day (pcd).

Table 2-4. Recent Fairfax County MSW Generation Rate Data

Year	Waste disposal (tons) ^a	Recycling (tons)	Total generation (tons)	Population	MSW generation rate (pcd)
2000	677,300	405,539	1,082,839	1,001,624	5.92
2001	807,842	401,368	1,209,210	1,016,406	6.52
2002	830,602	386,019	1,216,621	1,032,205	6.46
Average					6.30

^aThe county weight scale records identify the annual quantity of county MSW delivered to the Energy/Resource Recovery Facility (E/RRF) or diverted to landfills. The sum of these two numbers, minus metals recovered by the E/RRF (adjusted for Fairfax County percentage), provides the best available estimate of annual county waste disposal.

Formulas:

$$\text{Waste disposal (tons/yr)} + \text{recycling (tons/yr)} = \text{total waste generation (tons/yr)}$$

$$\text{Waste generation (pounds) per capita per day (pcd)} = \text{total waste generation (tons/yr)}^*$$

*365 days/yr divided by Population (2,000 pounds = 1 ton)

The average MSW generation rate in Fairfax County of 6.30 pcd is further supported by data provided by a major private hauler in the county. The hauler data suggests that a typical household generates approximately 42 pounds of solid waste for disposal and 11 pounds of recyclables (including yard waste) per week. Assuming an average household has 2.7 persons, this equates to a residential waste generation rate of 2.8 pcd. Based on these data and an estimated residential fraction of the waste of 45 percent, the calculated county MSW generation rate would be 6.22 pcd.

County collection route data also support the county’s calculated MSW generation rate. For households that have county-provided collection services, the average residential waste generation rate is 3.09 pcd. Based on these data and an estimated residential fraction of the waste of 45 percent, the calculated county MSW generation rate would be 6.82 pcd.

Recycling data

In recent years, the county MSW recycling rate has ranged from 32.0 to 35.6 percent.

The annual county recycling reports calculate total recycling tonnage for each calendar year. Table 2-5 summarizes county recycling totals for 2000 through 2002. Recycling data include residential and commercial recyclables, yard waste, special waste recyclables, and metals recovered by the waste-to-energy facility in Fairfax County, the Energy/Resource Recovery Facility (E/RRF).



Table 2-5. Fairfax County Recycling Data (tons)

Material	2000	2001	2002
Paper	173,868	174,295	157,963
Metal	89,616	75,877	75,477
Plastic	3,521	2,508	2,581
Glass	17,228	9,183	10,453
Commingled bottles/cans	4,136	10,246	13,662
Yard waste	102,480	112,745	106,768
Wood	1,260	392	982
Textiles	444	2,711	2,353
Waste tires	4,229	3,950	7,649
Used oil	7,208	7,316	6,138
Used oil filters		128	182
Used antifreeze		920	705
Batteries	582	981	956
Electronics		54	132
Chemicals/solvents	967	61	47
Total material recycled	405,539	401,367	386,019
Waste generated	733,340	772,817	820,096
Total waste stream	1,138,879	1,174,184	1,206,115
County recycling rate (%)	35.6	34.2	32.0

CDD

Waste Generation Activities

CDD constitutes a major portion of the county solid waste stream. As defined by the Virginia Solid Waste Management Regulations, CDD includes the following:

CDD includes waste generated during (1) construction, remodeling, or repair of buildings or pavements; (2) destruction of structures and their foundations; and (3) land clearing operations.

- *Construction waste.* Solid waste produced or generated during construction, remodeling, or repair of pavements, houses, commercial buildings, and other structures. Construction wastes include lumber, wire, sheetrock, broken brick, shingles, glass, pipes, concrete, paving materials, and metal and plastics if the metal or plastics are part of the materials of construction or empty containers for such materials. Paints, coatings, solvents, asbestos, any liquid, compressed gases or semi-liquids, and garbage are not construction wastes.



- *Demolition waste.* Solid waste produced by the destruction of structures and their foundations, which includes the same materials as construction wastes.
- *Debris waste.* Wastes resulting from land clearing operations. Debris wastes include stumps, wood, brush, soil, and road spoils.

Waste Generation Rates

CDD generated in Fairfax County is primarily disposed of at three facilities in the county: Hilltop Sand and Gravel Company Debris Landfill (Alexandria), Lorton CDD Landfill (Lorton), and Rainwater Concrete Company Landfill (Lorton). In addition, three facilities in neighboring counties receive CDD generated in Fairfax County: Potomac Landfill (Dumfries), WMI (Manassas), and Corral Farm (Warrenton). Each of these facilities provided data on annual quantities of waste received and the estimated percentage attributable to Fairfax County. Table 2-6 shows the data submitted by the facilities. (CDD is not weighed at these facilities; tonnage is estimated based on volumes.)

Table 2-6. CDD Facility Estimated Waste Receipts (tons)

Facility		1998	1999	2000	2001	2002	Average
Hilltop Debris LF	Total	350,000	300,000	250,000	200,000	200,000	260,000
	Fairfax	297,500	255,000	212,500	170,000	170,000	221,000
Lorton CDD LF	Total	868,000	955,000	1,050,000	1,155,000	1,040,000	1,013,600
	Fairfax	325,000	358,000	394,000	433,000	390,000	380,000
Rainwater Conc. Co. LF	Total	32,000	35,000	51,000	43,000	44,000	41,000
	Fairfax	24,000	25,000	41,000	33,000	30,000	30,600
Potomac LF	Total	—	—	—	—	—	—
	Fairfax	10,000	19,000	28,000	38,000	47,000	28,400
WMI Manassas TS	Total	33,000	33,000	33,000	33,000	33,000	33,000
	Fairfax	11,000	11,000	11,000	11,000	11,000	11,000
Corral Farm LF	Total	165,000	165,000	165,000	165,000	165,000	165,000
	Fairfax	83,000	83,000	83,000	83,000	83,000	83,000
Total Fairfax CDD		750,000	751,000	769,000	767,000	730,000	753,400
Population		962,910	978,038	1,001,624	1,016,406	1,032,205	998,237
CDD gen. rate (pcd)		4.27	4.21	4.21	4.13	3.88	4.14

No Fairfax County-specific CDD waste stream characterization data are available to estimate the percentage composition of the CDD waste stream of each waste type. A 1998 national study of CDD provided limited data on several waste characterization studies, and the CDD composition varied greatly depending on the type of project undertaken. The study found, in general, that the major components of CDD for residential projects are wood (14 to 67 percent), drywall (17 to 27 percent), roofing materials, concrete, and brick.



The average county CDD generation over the last five years is 4.14 pounds per capita per day.

Fairfax County estimated its CDD per capita generation rate by dividing total annual CDD attributable to Fairfax County received by the facilities listed in Table 2-6 by the county population for that year. As presented in Table 2-6, the generation rate has decreased over the preceding five years from 4.27 to 3.88 pcd, or 10 percent. Over the last five years, the average CDD generation rate is 4.14 pcd.

Special Wastes

Special wastes generated in Fairfax County include hazardous wastes, regulated medical wastes, household hazardous wastes, tires, used oil, used antifreeze, batteries, sludge, and septage.

Waste Generation Activities

Special wastes are components of the county solid waste stream that have unique collection, disposal, or recycling requirements. These wastes include hazardous wastes, regulated medical wastes (RMW), HHW, tires, used oil, used antifreeze, batteries, sludge, septage, mining wastes, agricultural wastes, and spill residues.

Hazardous wastes generated by commercial activities are regulated and must be disposed of properly. Hospitals and clinics generate RMW. Households, auto shops, and vehicle repair shops run by county agencies, cities, and towns generate tires, used oil, antifreeze, and batteries. Residents generate HHW at their homes, including aerosols, pesticides, oil based paints, and other hazardous materials. Homes with septic systems generate septage (mostly in the western part of the county). The county's wastewater treatment plant, the Noman M. Cole, Jr. Pollution Control Plant, generates sludge that is managed on-site.

Fairfax County generates minimal reportable agricultural wastes, mining wastes, and spill residues. The county does not expect the annual generation quantities of these wastes to increase to measurable levels, so this report does not include waste projections for these special wastes.

Waste Stream Material Types and Generation Rates

Hazardous Wastes

EPA establishes criteria for the identification and classification of hazardous wastes and sets requirements for their proper management. In

Fairfax County, private companies collect, transport, and dispose of hazardous wastes generated in the county. These wastes are disposed of in certified facilities to prevent the release of hazardous constituents to the environment.

Businesses in Fairfax County that generate more than 220 pounds or 27 gallons of commercial hazardous waste per month are categorized as hazardous waste generators and must abide by EPA and Department of Transportation (DOT) hazardous waste regulations. These regulations include specific requirements for the transport, storage, and disposal of commercial hazardous waste; hazardous waste generators typically contract with permitted disposal companies for collection. These companies include Clean Harbors Environmental Services, Inc., Clean Venture, Inc., and Potomac Environmental, Inc.

For conditionally exempt small quantity generators (CESQG)—businesses that generate less than 220 pounds or 27 gallons of hazardous material per month—Fairfax County provides a CESQG collection program. Safety Kleen Services, Inc., and Curbside, Inc., which operate the program, collect and dispose of hazardous waste directly from the business.

Regulated Medical Waste

RMW is primarily generated by medical facilities. A solid waste is considered RMW if it meets the following criteria defined by the VDEQ in 9VAC 20-120-140 of the Virginia Regulations:

Any solid waste, as defined in this chapter is a regulated medical waste if it is suspected by the health care professional in charge of being capable of producing an infectious disease in humans. A solid waste shall be considered to be capable of producing an infectious disease if it has been or is likely to have been contaminated by an organism likely to be pathogenic to healthy humans, such organism is not routinely and freely available in the community, and if such organism has a significant probability of being present in sufficient quantities and with sufficient virulence to transmit disease. If the exact cause of a patient's illness is unknown, but the health care professional in charge suspects a contagious disease is the cause, the likelihood of pathogen transmission shall be assessed based on the pathogen suspected of being the cause of the illness.²

Examples of RMW include human blood and body fluids or items contaminated with these fluids, organs, body parts, needles and syringes (sharps), bedding materials, and bandages.

² Virginia Waste Management Board, 9 VAC 20-120, "Regulated Medical Waste Management Regulations."

Generation Rates



RMW is either treated on-site by generating facilities or collected and disposed of by licensed RMW management companies. No data exist on quantities of RMW managed within the county. However, the VDEQ collects data on solid waste managed in the state annually. RMW generation in Virginia ranged from 21,132 to 24,591 tons per year

from 1999 to 2002 (Table 2-7).

Table 2-7. Virginia RMW Generation (tons)

	1999	2000	2001	2002	Average
RMW	21,821	23,076	21,132	24,591	22,655
Virginia Population	6,872,912	7,105,900	7,196,750	7,293,542	7,117,276
Generation rate (pcd)	0.0174	0.0178	0.0161	0.0185	0.0174

INOVA Fairfax Hospital is the only facility in the county that processes RMW.

INOVA Fairfax Hospital in Falls Church is the only facility in Fairfax County that processes RMW. This facility processes approximately 2,250 tons of RMW per year, all from INOVA Fairfax and INOVA Mount Vernon hospitals.

Generally, all RMW received at the facility is first shredded and then microwaved. After the waste has been treated in accordance with Virginia regulations, it is no longer classified as RMW. After treatment, the confetti-like product is compressed for transportation to out-of-county landfills.

The facility processes the following materials on-site:

- Human blood and body fluids
- Sharps
- Laboratory and microbiological waste
- Isolated waste associated with diseases not regularly found in the community
- Cleanup materials from body fluid spills
- Other contaminated materials.

The facility does not process all materials received. The following materials are transported off-site for processing:

- Pathological waste
- Chemo waste
- Hazardous chemicals.

Off-site disposal methods include incineration and steam sterilization. Virginia’s RMW management regulations set standards for the storage, transportation, and treatment of RMW. It must be either stored, steam

sterilized, incinerated, or treated by an acceptable alternative mechanism in an acceptable facility. Innovative treatment technology may be allowed if the effectiveness of the treatment can be demonstrated.

In some cases, transportation of RMW by medical personnel requires no prior certification to VDEQ. However, commercial operators must file a certification that their businesses satisfy VDEQ's requirements before they can accept infectious material for transport. In all cases, the transportation of RMW is subject to the provisions in 49 CFR 171 through 178.

Fairfax County provides collection facilities for hazardous wastes generated from households (HHW).

Household Hazardous Wastes

VDEQ defines household hazardous wastes (HHW) as any household waste material that would be classified as a hazardous waste if it came from a business.³

Households generate many types of HHW during daily activities. Generally, a substance is considered hazardous if it can catch fire, react or explode when mixed with other substances, or is corrosive or toxic. Hazardous substances are specifically defined as follows:



- *Corrosive.* A chemical, or its vapors, that can cause deterioration or irreversible alteration in body tissues at the site of contact and deteriorate or wear away the surface of a material.
- *Flammable.* A substance that can be ignited under almost all temperature conditions.
- *Irritant.* A substance that causes soreness or inflammation of the skin, eyes, mucous membranes, or respiratory system.
- *Toxic.* A substance that may cause injury or death upon ingestion, absorption, or inhalation.

³ Virginia Waste Management Board, 9 VAC 20-80-10, "Definitions."

The most common types of HHW collected by the county are as follows:

Acids	Driveway sealers	Insecticides	Polishes
Aerosol sprays	Floor care products	Mercury products	Pool chemicals
Asbestos products	Fungicides	Moth balls	Rust removers
Automotive fluids	Glue (solvent base)	Paint (oil base)	Varnish and stains
Batteries	Herbicides	Paint thinner	Weed killers
Coal tar products	Inks and dyes	Poisons	Wood preservatives

Generation Rates

The county collects a significant amount of county-generated HHW at its two collection centers (the I-66 Transfer Station and I-95 Landfill Complex). Some HHW generated in the county is commingled with MSW and disposed of in residential and commercial trash containers, making it impossible to provide a reliable HHW generation rate for the county. Table 2-8 shows quantities of HHW collected by the county over the preceding years by HHW material.

Table 2-8. Fairfax County Annual HHW Collection (pounds)

Material	1998	1999	2000	2001	2002	Totals	Average
Solvents	96,850	108,600	89,300	73,600	80,950	449,300	89,860
Oil paints	89,600	85,750	71,000	87,050	100,750	434,150	86,830
Flammables in cans	21,000	68,775	62,475	58,275	50,400	260,925	52,185
Pesticides	65,325	75,150	64,800	86,400	85,500	377,175	75,435
Corrosives, bulk	3,200	5,200	3,600	5,200	6,000	23,200	4,640
Corrosives, labpack	4,300	3,700	2,040	4,400	5,620	20,060	4,012
Ammonia, bulk	400	800	—	—	400	1,600	533
Mercury	590	325	550	50	50	1,565	313
Aerosols	21,025	20,800	24,600	34,650	4,800	105,875	21,175
Lithium batteries	100	—	—	—	50	150	75
NiCad batteries	3,600	1,800	600	1,800	1,200	9,000	1,800
Misc. chemicals	600	1,595	60	—	20	2,275	569
Reactives	196	20	—	—	1,600	1816	605
Oxidizer	1,350	4,050	450	2,250	3,600	11,700	2,340
Asbestos	—	200	200	400	200	1,000	250
Absorb with oil	800	—	—	—	—	800	800
Total pounds	308,936	376,765	319,675	354,075	341,140	1,700,591	340,118
Total tons	154	188	160	177	171	850	170

Table 2-9 show historical totals for county HHW, tires, oil, batteries, septage, and sludge generation.

Table 2-9. Fairfax County Special Waste Generation (tons)

Waste	1998	1999	2000	2001	2002	Average	Generation rate (lb/c/d)
HHW	193	198	165	178	184	184	0.0010
Tires	—	7,415	11,243	11,639	9,562	9,965	0.0542
Oil	—	8,019	7,208	7,316	—	7,514	0.0412
Antifreeze	—	—	—	920	—	920	0.0050
Batteries	—	482	582	981	—	682	0.0037
Septage	—	—	—	—	75,019	75,019	0.3982
Sludge ^a	—	52,450	55,770	50,270	53,890	53,095	0.2889
Population ^b	962,910	978,038	1,001,624	1,016,406	1,032,205	998,237	

^a Data represent quantities of sludge prior to incineration

^b Includes populations of the Cities of Fairfax and Falls Church and the Towns of Herndon, Vienna, and Clifton

Fairfax County collects used tires at the I-95 Landfill Complex for transport to tire recyclers.

Used Tires

Virginia bans the land disposal of used tires. In addition, the General Assembly enacted a 50¢-per-tire tax (Section 58.1-641 of the Code of Virginia) and directed VDEQ to develop and implement a plan (Section 10.1-1422 of the Code of Virginia) for the transportation and management of all waste tires generated within the state. Virginia temporarily raised the tax to \$1 per tire between July 2003 and July 2006. The revenues are placed in the Waste Tire Trust Fund.



Used tires collected in Fairfax County are recycled for use for civil engineering projects, as a fuel source, and in recycled products, primarily outside of the county. Tire use in civil engineering projects includes landfill daily cover, landfill drainage media, landfill improvements, septic drainfields, golf course drainage, and roadway base. As a fuel source, chipped or shredded tires are used in some waste-to-energy facilities, electricity-generating facilities, pulp and paper mills, and cement kilns. The recycled product uses include mats, highway noise walls, pavement sealers, playground surfaces, brake pads, blasting mats, eco-blocks, and arena footings.

Private haulers collect used tires from auto shops and transport them to the I-95 Landfill Complex. County agencies and cities and towns throughout the county also bring tires to these facilities. Used tires are collected from auto shops by private haulers and transported to the I-95 Landfill Complex. Tires are accepted at the I-95 Landfill Complex and shredded for use or transported to tire recyclers. An unknown quantity of used tires is also transported directly to recycling facilities, bypassing the county collection facilities.

Generation Rates

Used tire collection and recycling in Fairfax County, as reported by the Fairfax County Division of Solid Waste Collection and Recycling (DSWCR), ranged from 11,243 to 9,562 tons per year from 2000 through 2002. Table 2-9 includes the county collection data for tires.

Used oil and antifreeze are collected at county facilities, auto shops, and motor pools.

Used Oil and Antifreeze

Used oil and antifreeze are accepted at no charge at the citizen's drop-off centers at the I-95 and I-66 locations, as well as by private collection firms and recycling firms that service auto shops and motor pools.



Oil and grease wastes are also generated by restaurants in the county. Although these wastes do not meet the definition of special wastes, they are wastes that are of concern to the Fairfax County community.

Generation Rates

The DSWCR compiles data from all of these collection sources annually (Table 2-9).

Alkaline or carbon zinc household batteries may be disposed of with MSW.

Batteries



Used automotive batteries are accepted by battery retailers and at the county-run citizen disposal locations at I-95 and I-66. County recycling centers accept button, rechargeable (NiCad), mercury, and lithium batteries. Alkaline and carbon zinc household batteries may be disposed of with MSW.

NiCad batteries could present a significant challenge if they continue to be disposed of as waste in the future. There is the potential for increased amounts of cadmium to be released as the material is either incinerated or landfilled. (See Chapter 9 for recommendations concerning battery recycling.)

Generation Rates

Table 2-9 includes data for the batteries managed by the county recycling program.

Septage

Septage is the liquid and solid material pumped from a septic tank, cesspool, or other treatment facility after it has accumulated over a period of time. Much of it is collected from homes that do not have sanitary sewers. A septic tank usually retains 60 to 70 percent of the solids, oil, and grease that enter it. *Septage does not include sludge from sanitary sewers.*

Septage is generated from the 13 percent of county households not connected to the public sewer system.

Approximately 13 percent of the county's 360,000 households are not connected to the public sewer system. Septage from these residences is collected by private haulers and discharged at the Noman M. Cole, Jr. Pollution Control Plant, the Colvin Run Discharge Station, or the Upper Occoquan Sewage Authority Plant.

Generation Rates

Septage generation has remained relatively constant over the preceding years (Table 2-9). The county predicts septage generation will increase at the same rate as population growth as development increases in areas outside of sewer service areas.

Sludge is generated by the county's wastewater treatment plant and incinerated on-site.

Sludge



The Noman M. Cole Plant currently treats 54 million gallons of wastewater per day generated in Fairfax County using preliminary, primary, secondary, and tertiary treatment processes. Sludge is collected at the facility and dewatered to 30 percent solids before incineration on-site. The ash residue is

disposed of in the I-95 Complex ash landfill. Sludge is also generated at the Upper Occoquan Sewage Authority's (UOSA) Regional Water Reclamation Plant and landfilled on-site.

Generation Rates

Sludge generation has remained relatively constant over the preceding years (Table 2-9). The county predicts sludge generation will increase at the same rate as population growth over the SWMP planning period.

Solid Waste Generation Projections

Approach

Method

For each major solid waste category, the county established a per capita generation rate on the basis of available historical records of waste generation and disposal over the preceding five years. The county then used the generation rates in conjunction with county population projections to estimate waste volumes for the 20-year planning period. The county adjusted these generation rates over the planning period in response to projected impacts of urbanization, intensity of construction activity, economic growth, and recycling trends.



The waste projections assume the continuation of the county's current waste management practices.

The county established generation factors by adding total annual county waste disposed of and total county waste recycled in each waste category, and dividing by the county population for the year under consideration. The county evaluated the trend in the generation rate over the five-year period using the factors mentioned above to determine

generation rates to be used over the 20-year planning period.⁴ *The waste and recycling projections throughout this chapter assume the continuation of the county's current waste management practices and conditions, unless otherwise stated.*

Sources of Information

The Fairfax County Division of Solid Waste Disposal and Resource Recovery (DSWDRR) maintains a detailed report (known as the 904 Report) on MSW quantities accepted at the I-66 Transfer Station and E/RRF. The 904 Report documents annual quantities of MSW generated within the county that were ultimately disposed of by either incineration or landfill. Records maintained by the county DSWCR were used to determine annual county recycling quantities, including yard waste, tires, used oil, antifreeze, and batteries.

For CDD, the county used reports published by the VDEQ on annual tonnages accepted by CDD landfills in conjunction with interviews with the CDD landfill and transfer facility operations personnel. Operations personnel estimated historical waste tonnage accepted and the percentage of waste receipts originating in Fairfax County.

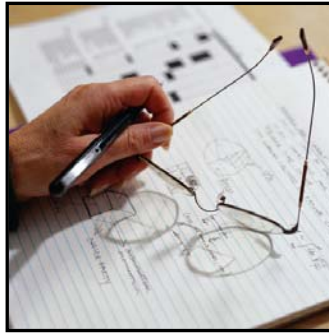
The county maintains records of annual quantities of HHW it collects at the I-66 Transfer Station and I-95 Landfill Complex. No data were available for RMW generation and disposal in Fairfax County; the county projected RMW from statewide data collected by VDEQ and included in the report *Solid Waste Managed in Virginia During Calendar Year 2002*. The only RMW facility in Fairfax County is the autoclave/microwave treatment facility at INOVA Fairfax Hospital.

The Noman M. Cole Plant and the Upper Occoquan Sewage Authority Data maintain records for annual quantities of septage collected in the county. The county based annual quantities of sludge generated on ash generation data from the Noman M. Cole Plant documented in the 904 Report. Sludge quantities were calculated using the Cole facility estimate of a 90 percent reduction in sludge weight during incineration.

Fairfax County generates minimal reportable agricultural wastes, mining wastes, and spill residues. Since the county does not expect the annual generation quantities of these wastes to increase, the SWMP does not include waste projections for these special wastes.

⁴ For this report, solid waste generated by the county includes wastes generated by the Cities of Fairfax and Falls Church and the Towns of Vienna, Clifton, and Herndon.

MSW Generation Forecasts



The county based waste generation projections on the predicted per capita MSW generation rate and population projections for the planning period. In addition, employment projections may be used to predict commercial waste generation, as discussed later in this section.

For projections of recycling quantities, the county forecasted its recycling rate to increase from 32 percent to 35 percent over the SWMP planning period. Although its 2002 recycling rate was 32 percent, the county has consistently achieved 35 percent recycling using current solid waste management practices. Therefore, the county projects that the recycling rate will gradually increase from 32 percent to 33.5 percent in 2010, and finally to 35 percent in 2015 and beyond.

Fairfax County Waste Generation Rate

Based upon the average of the past three years, the waste generation rate for Fairfax County is 6.30 pcd. Appendix C contains further analysis of the historical basis for the county's waste generation rate.

Regional and National Per Capita Generation Data

The estimated MSW generation rate in Fairfax County is higher than national and regional generation rate estimates. Nationally, the MSW generation rate has remained constant at 4.51 pcd in both 2000 and 1990. Regionally, the MWCOG report indicated an MSW generation rate of 5.8 pcd for the Washington metropolitan area.

MSW Projections

From the differing trends and estimates of MSW generation in the county, the county developed four alternative MSW projections to address the probable range of variance in the future generation rates. Table 2-10 presents the projections of MSW generation and disposal for these four alternatives over the next 20 years. Appendix C details the development of Fairfax County's MSW projections.

Fairfax County developed four alternative projections for MSW to address the probable range of variance in future waste generation rates.

Table 2-10. Fairfax County MSW Generation and Disposal Projections (thousands of tons)

Year	Alternative 1		Alternative 2		Alternative 3		Alternative 4	
	MSW generation	MSW disposal	MSW generation	MSW disposal	MSW generation	MSW disposal	MSW generation	MSW disposal
2004	1,223	832	1,248	848	1,264	859	1,289	877
2005	1,241	844	1,279	870	1,280	871	1,319	897
2010	1,322	879	1,431	952	1,384	921	1,499	997
2015	1,363	886	1,551	1,008	1,432	931	1,630	1,059
2020	1,392	904	1,664	1,082	1,479	962	1,770	1,150
2025	1,406	914	1,768	1,149	1,519	987	1,909	1,241

MSW disposal quantities are projected to range from 832,000 to 1,241,000 tons from 2004 to 2025 depending on the year and projection assumptions.



Fairfax County projects its annual MSW disposal quantities will range from 832,000 tons to 1,241,000 tons between 2004 and 2025, depending on the year and assumptions used for the calculation. Clearly, waste will increase with increases in population and employment. The rate of increase depends on recycling rates and costs for disposal. If recycling rates

increase, the county's MSW disposal requirements will be lower. Also, if disposal costs increase enough, MSW disposal quantities will decrease as residents and businesses find other less costly ways to manage their waste.

Yard Waste and Special Wastes

The county also developed waste projections for two components of MSW, yard waste and special wastes. Yard waste projections are discussed below; special waste projections are discussed later in this chapter.



Yard waste projections are based on the county's 1990 municipal waste composition study that estimated yard waste as 9.4 percent of the MSW stream. Using this percentage and the above MSW projections, the county estimated yard waste generation over the SWMP planning period for the four MSW projection alternatives. Table 2-11 shows the results. (Yard waste is a component of MSW, and these projections are also included in the MSW projections.)

Table 2-11. Fairfax County Yard Waste Generation Projections (thousands of tons)

Year	Alternative 1	Alternative 2	Alternative 3	Alternative 4
2004	115	117	119	121
2005	117	120	120	124
2010	124	135	130	141
2015	128	146	135	153
2020	131	156	139	166
2025	132	166	143	179

Fairfax County developed two alternative projections for CDD to address the probable range of variance in future waste generation rates.

CDD Generation Forecasts



Fairfax County developed two alternatives for CDD generation projections (Tables 2-12 and 2-13). The first alternative uses a constant generation rate, which is based on the five-year Fairfax County generation rate average of 4.14 pcd. The second alternative assumes the current trend in generation rates will continue over

the planning period, with the current rate declining at 1 percent per year. Construction activity in the county has been at a high level in recent years, and it is likely to lessen over the planning period; therefore, a reduction in the per capita CDD generation rate for the county is probable.

Table 2-12. Fairfax County CDD Generation Projections 2004–2025 (in thousands of tons), Alternative 1: Generation Rate Remains Constant

Year	Population	Waste generation rate (pcd)	CDD projection (tons)
2004	1,063,735	4.14	803,250
2005	1,079,600	4.14	815,230
2010	1,149,500	4.14	868,013
2015	1,185,400	4.14	895,122
2020	1,210,300	4.14	913,924
2025	1,223,100	4.14	923,590

Table 2-13. Fairfax County CDD Generation Projections 2004–2025 (in thousands of tons), Alternative 2: Generation Rate Decreases at 1 Percent per Year

Year	Population	Waste generation rate (pcd)	CDD projection (tons)
2004	1,063,735	4.06	787,265
2005	1,079,600	4.01	791,017
2010	1,149,500	3.82	800,954
2015	1,185,400	3.63	785,488
2020	1,210,300	3.45	762,683
2025	1,223,100	3.28	732,974

Events such as a significant increase in CDD tipping fees due to disposal capacity restrictions could result in a reduced disposal rate. In addition, operation of a CDD reuse or recycling center may reduce the disposal rate.

Special Waste Generation Forecasts

Table 2-14 shows projected generation quantities for each special waste category. The generation rate is based on the county average annual generation over the preceding five years, divided by the average population for that period. For septage, data for a major collection point, Colvin Run, were only available for 2002; therefore, we used data from that year only in the septage generation forecast

Table 2-14. Fairfax County Special Waste Generation Projections 2004–2025 (tons)

Waste	Gen. rate (pcd)	2004	2005	2010	2015	2020	2025
HHW	0.0010	196	199	212	219	223	225
Tires	0.0542	10,526	10,683	11,374	11,730	11,976	12,103
RMW	0.0174	3,386	3,436	3,659	3,773	3,853	3,893
Oil	0.0412	8,004	8,123	8,649	8,920	9,107	9,203
Antifreeze	0.0050	963	977	1,041	1,073	1,096	1,107
Batteries	0.0037	726	737	785	809	826	835
Septage	0.3982	77,311	78,464	83,544	86,153	87,963	88,893
Sludge	0.2889	56,083	56,919	60,604	62,497	63,810	64,485
Population		1,063,735	1,079,600	1,149,500	1,185,400	1,210,300	1,223,100

