City of Savannah, Georgia
Impact Fee Program

Capital Improvements Element

Addressing:
Parks and Recreation
Fire Protection Law Enforcement
Road Improvements

DRAFT: August 25, 2022

Introduction

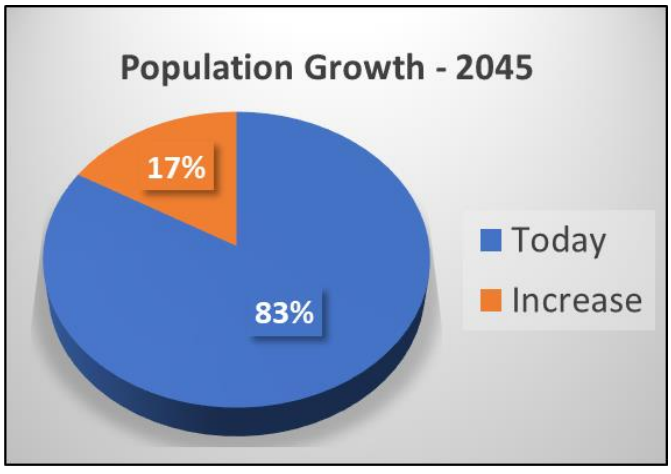
The purpose of a Capital Improvements Element (CIE) is to establish where and when certain new capital facilities are planned to be provided within a jurisdiction and the extent to which they may be financed through an impact fee program. A Capital Improvements Element is adopted as a chapter, or 'element', in a local government's Comprehensive Plan. This CIE addresses the following public facility categories: **Parks and Recreation**, Public Safety Facilities (including **Law Enforcement** and **Fire Protection**), and **Road Improvements**.

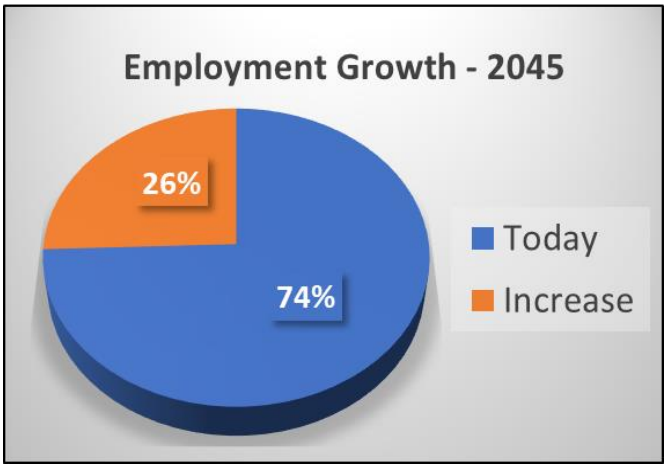
As required by the Georgia Development Impact Fee Act ("State Act" of "DIFA"), and defined by the Department of Community Affairs in its Development Impact Fee Compliance Requirements, the CIE must include the following for each capital facility category for which an impact fee will be charged:

- a **projection of needs** for the planning period (a minimum of 20-years);
- the designation of **service areas** - the geographic area in which a defined set of public facilities provide service to development within the area;
- the designation of **levels of service** (LOS) - the service level that will be provided;
- a **schedule of improvements** ("Community Work Program") listing impact fee related projects and costs for at least the coming 5 years; and
- a description of **funding sources** anticipated for the planning period.

Looking Ahead

Forecasts indicate continued growth ahead for Savannah as people continue to move into the city, propelled by favorable living conditions, a variety of housing types, and exceptional access to jobs and services. Over the next 23 years to 2045, it is expected that about 17% of the people that will be living in Savannah then are not here today.





Population Outlook

The future increase in population is not unprecedented. Looking back, since 2000 the city's population grew from 132,895 to 149,075 in 2021—a 12.18% increase. After a slight 'slump' in population between 2000 and 2005, since 2005 the city's population has steadily grown, unimpeded by the collapse of the housing market and the onset of the Great Recession in 2008. As a relatively 'mature' city, the growth rate since 2005 has produced an overall population increase of 12.15%, which is an average annual rate of increase of 0.81%. As the city further matures and development and redevelopment opportunities continue, the annual rate of population growth is expected to continue at an overall average for the 24-year period of 0.92% per year, reflecting at total increase of 32,984 people, an overall growth of 22.13%.

Increased Job Opportunities

New employment opportunities will continue to be attracted to the city as well. It is expected that job growth in 'value-added' categories[1] will outpace population increase such that, by 2045, there will be almost as many value-added jobs as there will be people living in the city. About two-thirds of the increase in jobs will be in four employment categories: the most notable being office administrators (20% of all new jobs), accommodation & food services (18%), transportation & warehousing (16%), and health care & social assistance (12% of all new jobs). Together, these four categories account for two-thirds of all new jobs created in the city. Compared to today's total value-added employment of 132,000, new jobs will have added more than 45,000—a 34% increase over today. Bottom line – 26% of all value-added jobs in the city in 2045 are not here now.

With all of this projected population and employment growth by 2045, Savannah will be called upon to increase the capacity of its facilities and infrastructure. This expansion will be necessary in order to maintain the attractive quality of life and business environment enjoyed today by residents and businesses alike.

For more information on anticipated growth, see the Forecasts section of this report. In addition, detailed growth forecast methodologies are presented in Technical Appendix A, *Future Growth Forecasts*.

Impact Fees

Impact Fees Authorized by State

Impact fees are a form of revenue allowed by the State, and strictly defined and regulated through State law. Impact fees are authorized in Georgia under Code Section 37-71, the Georgia Development Impact Fee Act (DIFA), and are administered by the Georgia Department of Community Affairs (DCA) under Chapter 110-12-2, Development Impact Fee Compliance Requirements.

Under DIFA, a city or county can collect money from new development based on that development's proportionate share—the 'fair share'—of the cost to provide future public facilities that will be needed. An impact fee is assessed as new development occurs and can help shift the burden for funding public facilities from the tax base as a whole to the new growth and development actually creating the need for these capital improvement projects.

[1] 'Value-added' jobs exclude government, construction and agricultural workers, since they are not assessed impact fees.

The provisions of the DIFA are extensive in order to assure that new development pays no more than its fair share of the costs and that impact fees are not used to solve existing service deficiencies. Ultimately, and importantly, the services provided in the public facility categories for which impact fees are being charged must be the same for both the existing community and future growth. Under DIFA, these categories include:

- parks, open space, and recreation areas and related facilities;
- public safety facilities, including law enforcement, fire, emergency medical services, and E-911 emergency communications;
- animal control;
- libraries;
- roads, streets, and bridges;
- stormwater and flood control facilities;
- water supply, treatment, and distribution; and,
- wastewater collection, treatment, and disposal.

The table below shows the public facility categories that are eligible for impact fee funding (in whole or in part) under Georgia law and that were selected by the Savannah City Council to be included in an impact fee program.

Table 1: Overview of Impact Fee Program Facilities

	Public Safety		Parks and Recreation		Road Improvements
	Fire Protective Services	Police Protective Services	Parks & Recreation Components	Trail System	
Eligible Facilities	Fire Stations, fire trucks and other apparatus, training facilities	Headquarters and support space, precinct stations, and long-lived vehicles	Recreation buildings and components such community centers, ballfields, and playgrounds	Comprehensive system of multi-use trails	Road projects creating capacity for Savannah residents and workers
Service Area	Citywide	Citywide	Citywide	Citywide	Citywide
Level of Service Standard Based on ...	Floor area and number of vehicles per day-night population	Floor area and number of vehicles per day-night population	Number of acres and number of recreation components per housing unit	Legnth of trail per 2045 day/night population	LOS "C" for corridors LOS "D" for intersections*
Historic Funding Source(s)	General Fund, Sales Taxes	General Fund, Sales Taxes	General Fund, Sales Taxes	General Fund, Sales Taxes	General Fund, Sales Taxes

* See also Road Improvements chapter of this report.

The following terms are used in the Overview Table:

Eligible Facilities under the State Act are limited to capital items having a life expectancy of at least 10 years, such as land, buildings and other facilities, and major rolling stock (such as fire trucks). Impact fees cannot be used for maintenance, supplies, personnel salaries, or other operational costs, or for short-term capital items such as desktop computers, furniture and tennis nets and balls. None of these costs are included in the impact fee system.

Service Areas are the geographic areas that the facilities serve, and the areas within which the impact fee would apply. Monies collected in a service area for a particular type of facility may only be spent for that purpose, and only for projects that serve that service area.

Level of Service Standards are critical to determining new development's fair share of the costs. The same standards must be applied to existing development as well as new to assure that each is paying only for the facilities that serve it. New development cannot be required to pay for facilities at a higher standard than that available to existing residents and businesses, nor to subsidize existing facility deficiencies.

Editorial Conventions

This report observes the following conventions:

- The capitalized word 'City' applies to the government of Savannah, the City Council or any of its departments or officials, as appropriate to the context. An example is "the City has adopted an impact fee ordinance".
- The lower-case word 'city' refers to the geographical area of Savannah, as in "the population of the city has grown".
- The same conventions are applied to the words 'County' and 'county', 'State' and 'state'.
- Single quote marks (' and ') are used to highlight a word or phrase that has a particular meaning as used in this report or refers to a heading in a table.
- Double quote marks (" and ") are used to set off a word or phrase that is a direct quote taken from another source, such as a passage or requirement copied directly from a law or report.

Importantly …

- Numbers shown on tables are often rounded from the actual calculation of the figures for clarity, but the actual calculated number of decimal points is retained within the table for accuracy and further calculations.

Forecasts

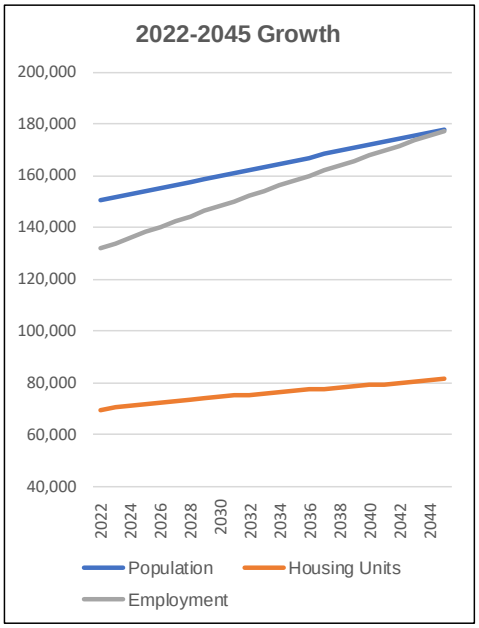
In order to accurately calculate the demand for future services in Savannah, new growth and development must be quantified in future projections. These projections include forecasts for population, households, housing units, and employment over the next 23 years to 2045. The projections provide the baseline conditions from which the current (2022) Level of Service calculations are produced. Also, projections are combined to produce what is known as 'day-night population'. This is a method that combines resident population and employees to produce an accurate picture of the total number of persons that rely on certain 24-hour services, such as fire protection. The projections used for each public facility category are specified in each public facility chapter.

This table below presents a summary of the forecasts that have been identified as the most likely for Savannah, based on an analysis of past trends. The specific methodologies are detailed in the attached Appendix A.

Table 2: Future Growth Projected in the City

	Population	Housing Units	Value-Added Employment	Day-Night Population
2022	150,450	69,829	131,923	282,373
2023	151,824	70,617	133,962	285,786
2024	153,198	71,372	136,002	289,200
2025	154,573	72,095	138,041	292,614
2026	155,947	72,794	140,084	296,031
2027	157,321	73,474	142,117	299,438
2028	158,696	74,136	144,157	302,853
2029	160,070	74,769	146,196	306,266
2030	161,444	75,379	148,234	309,678
2031	162,818	75,973	150,190	313,008
2032	164,193	76,547	152,147	316,340
2033	165,567	77,108	154,104	319,671
2034	166,941	77,657	156,061	323,002
2035	168,316	78,198	158,020	326,336
2036	169,690	78,736	159,969	329,659
2037	171,064	79,273	161,927	332,991
2038	172,439	79,805	163,883	336,322
2039	173,813	80,329	165,841	339,654
2040	175,187	80,853	167,796	342,983
2041	176,562	81,395	169,673	346,235
2042	177,936	81,957	171,552	349,488
2043	179,310	82,533	173,429	352,739
2044	180,685	83,119	175,308	355,993
2045	182,059	83,702	177,185	359,244
2022-2045 Increase	**31,609**	**13,873**	**45,262**	**76,871**

* Day-Night Population is the total of all residents living in the city and all jobs located in business uses subject to impact fees (i.e., the total population served on a 24-hour basis).



	Population	Housing Units	Value-Added Jobs
2022	150,450	69,829	131,923
2045	182,059	83,702	177,185
Increase	31,609	13,873	45,262
Percent	21.0%	19.9%	34.3%

Parks and Recreation

Parks and Recreation Components

Introduction

Public recreational opportunities are available in Savannah through a number of park and recreation facilities maintained by the City's Recreation and Leisure Services Department. Demand for these facilities is almost exclusively related to the city's resident population. Businesses and visitors make some incidental use of public recreation facilities, such as basketball courts, but the use is minimal compared to that of the families and individuals who live in the city. Thus, the impact fee for parks and recreation facilities is limited to future residential growth.

Conversely, the City's trail system (Tide to Town Trail) will provide connectivity between parks, neighborhoods and business centers. Since the trail system is for use by residents and local employees alike for walking, jogging, cycling and as access to parks and other destinations, its impact fee addresses the needs of both residential and nonresidential future growth. Because the 'service population' is different from that for public parks, the trail system is addressed later in this chapter under its own sub-heading.

The following sections focus on the City's active parks and recreation facilities and its passive neighborhood parks.

Service Area

The parks and recreation facilities maintained by the City are operated as a citywide system. Facilities are provided equally to all residents, and often used on the basis of the programs available, as opposed to proximity of the facility. For instance, children active in tennis play on courts at various locations, based on scheduling rather than geography. Other programs are located only at certain centralized facilities, to which any a resident can come. Thus, the entire city is considered a single service area for parks facilities and services.

Level of Service and Forecasts for Service Area

'Level of Service' (LOS) is the relationship between service capacity and service demand for public facilities. The determination of LOS standards for park acres and for recreational buildings and components begins with an inventory of existing City facilities, which is summarized on Table 3. Detailed listings of park acres and community centers are provided on Table 4.

Table 3 includes components the City does not currently have in its recreation system but plans to add in the future (i.e., skate parks). The table then provides LOS calculations based on the 'Current Inventory' divided by the number of housing units in the city (69,829), yielding the number of recreational components provided for each dwelling (since impact fees are assessed per housing unit when building permits are issued, not population).

The LOS calculations from Table 3 determine the existing demand for recreation components by today's population. This LOS standard (under 'Current LOS by Housing Unit') is then multiplied by the increase in housing units between 2022 and 2045 (13,873) to produce the future demand created by future growth, as shown under 'Future Demand' on Table 3.

Table 3: Level of Service and Forecasts for Service Area

Component Type	Current Inventory		Current LOS per Housing Unit*	Future Demand**	Total Needed (Rounded)	% Impact Fee Eligible
Park Acres	934.55	acres	0.013383365	185.67	0***	-
Recreation Buildings & Supporting Facilities						
Community Center/Gyms	149,859	sq. ft.	2.146085437	29,772.64	29,772	100.00%
Administrative Office Space	4,500	sq. ft.	0.064443140	894.02	894	100.00%
Concession Stands	2		0.000028641	0.40	1	40.00%
Restroom Buildings	7		0.000100245	1.39	2	69.50%
Park and Recreation Components						
Baseball Field	15		0.000214810	2.98	3	99.33%
Basketball Court, Outdoor	47		0.000673073	9.34	10	93.40%
Dog Park	3		0.000042962	0.60	1	60.00%
Fishing Pier	1		0.000014321	0.20	1	20.00%
Multi-Purpose Field	16		0.000229131	3.18	4	79.50%
Pavilion	32		0.000458262	6.36	7	90.86%
Playground	59		0.000844921	11.72	12	97.67%
Skate Park	0		n/a	2.00	2	16.57%
Softball Field	15		0.000214810	2.98	3	99.33%
Splash Pad	9		0.000128886	1.79	2	89.50%
Swimming Pool	9		0.000128886	1.79	1	100.00%
Tennis Court	35		0.000501224	6.95	7	99.29%
Volleyball Court, Outdoor	1		0.000014321	0.20	1	20.00%
Park Trails	7.82	miles	0.000112045	1.55	1.55	100.00%

* LOS based on the current inventory divided by current housing units (69,829).

** Future Demand (2045) calculated by multiplying the LOS by the 2022-2045 increase in housing units (13,873).

*** The amount of undeveloped city-owned land (900+ acres) that is slated for future park use exceeds future demand.

For all components except park trails the future demand is rounded to whole numbers in the 'Total Needed' column. This is because the City cannot build a portion of a facility; it must build entire facilities. As a result, the '% Impact Fee Eligible' column may reflect a percentage less than 100%.

For park acres, the 'Total Needed' is shown as '0' due to future demand being met through existing City-owned acreage that is undeveloped but is intended to be utilized for future park use. Over 900 acres have been acquired by the City in the New Hampstead and Highlands communities through donation, dedication, or parcel trade. The acreage will include opportunities for both active and passive recreation.

A component's impact fee eligibility ('% Impact Fee Eligible') is based on the extent to which future improvements are needed to specifically serve new growth and development, and only at the LOS applicable citywide.

For example, the City has 3 dog parks, but the adopted level of service indicates that only a portion of an additional dog park (.60) is needed to serve the future population. Since the City cannot build part of a dog park for it to fully serve its intended purpose, this number is rounded up to a single dog park, of which 60% is the amount that new growth mathematically demands. This is therefore the percentage of future dog parks that is impact fee eligible.

Additionally, 2 skate parks that are currently proposed will serve both the existing and future population. Of the projected total number of housing units in 2045 (83,702), 13,873 will be generated by new growth, or 16.57% of the total, which establishes the percent of impact fee eligibility of the improvement.

Table 4: Current Inventory of Park Lands and Community Buildings

Active Parks / Community Centers	Acres
38th Street	0.33
Alpine	0.89
Atwood	0.21
Avondale	1.01
Bacon Park Golf Course	260.77
Bacon Park Forest	163.39
Bacon Park Tennis	7.50
Baldwin	0.99
Barjan Terrace	2.22
Blackshear	2.45
Blueberry Hill	1.88
Boaen	1.41
Bryan, Charlie S.	0.61
Cann	2.21
Carver Village	0.93
Cedar Grove	6.30
Clark, Ben	1.42
Cloverdale*	3.98
Coffee Bluff Marina	3.21
Crossroad Villa	0.96
Crusader*	4.01
Cuyler	0.50
Daffin	74.81
Davant	0.19
Delaware*	0.52
Dixon	1.09
Edgemere/Sackville	1.02
Fairgrounds	41.20
Feiler	2.40
Fellwood	1.84
Fernwood/Parkwood	6.28
Flournoy, Mary C*	0.80
Ford, Bowles	57.27
Forrest Hills	7.39
Forsyth Park	11.66
Grant*	1.20
Gray, Rebecca (Hudson Hill)	5.08
Habersham	3.68
Harmon Creek	1.10
Hitch	2.21
Holly Heights	1.35
Hull	3.05
Jackson, Moses*	0.50
Jefferson Street	0.13
Kennedy (Carver Heights)*	4.31
Lamara Heights	1.02
Law, WW*	1.98
Liberty City*	7.32
Magnolia	2.20
Mohawk Lake	27.50
Ogeecheeton	0.28
Paulson, Allen Complex	17.79
Pierpont Circle	0.51
Ridgewood	1.02
River's End	0.51
Robinson, Robbie	0.80
Savannah Gardens	1.49
Scarborough, William Complex	6.50
Soldiers Field	3.00
Summerside	6.98
Sunset	3.86
Sylvan Terrace	1.22
Tatemville*	40.80
Thomas Square	1.94
Tompkins*	3.85
Treat	0.33
Tremont	0.20
Tremont Center*	0.41
Tribble, Joe (Tribble Lake)	51.17
Victory Heights	0.93
Wells	1.37
Westside	0.63
Wilshire	0.40
Windsor	10.36
Yamacraw	0.35
Active Park Acres	***892.98***

* Includes a community center

Neighborhood Passive Parks/ Greenspace	Acres
Adams Park	1.04
Ambush Park	1.20
Ashley Homes Park	1.20
Ashley Homes Square	1.20
Atlantic Mall	2.64
Baker Street	2.91
Brinkman Park	0.22
Chesterfield Circle	0.20
Dixon Park	1.18
Entleman Park	1.01
Floyd "Pressboy" Adams Park	1.13
Gaudry Park	0.95
Guckenheimer Park	0.87
John Henry Murphy	0.68
Kavanaugh Park	0.95
Lattimore Park	1.04
Lorraine Court	0.11
Malibou Circle	0.25
Mary Musgrove	1.68
McCauley Park	0.87
Myers Park	1.13
Nathaniel Green Park	3.29
Pierpont Circle	0.52
Rockwell Park	0.67
Savannah Gardens	1.28
Solomon Park	0.87
Sunrise Park	1.45
Theus Park	0.86
Tiedeman Park	2.85
Twickenham Park	2.80
Vetsburg Park	1.04
Wessels Park	0.68
West Side Park	2.80
Passive Park Acres	***41.57***

TOTAL PARK ACRES	***934.55***

Community Centers/Gymnasiums	Building Area
	square feet
Carver Village Neighborhood Center	7,100
Cloverdale Community Center	5,350
Crusader Neighborhood Center	6,800
Eastside Regional Center (Shuman)*	9,800
Grant Center Gymnasium**	10,380
Hudson Hill Community Center**	4,800
John S. Delaware Regional Center*	7,700
Liberty City Neighborhood Center	10,800
Mary Flournoy Golden Age Center	6,100
Moses Jackson Neighborhood Center	16,100
Pennsylvania Avenue Resource Center	18,000
Tatemville Neighborhood Center	4,600
Tompkins Regional Center*	8,300
Tremont Neighborhood Center	3,000
W.W. Law Regional Center*	5,039
Windsor Forest Regional Center*	22,090
Woodville Neighborhood Center	3,900
Total Building Area	***149,859***

* Center includes a gymnasium

** Under construction

Future Costs

The following table lists the future capital projects costs to provide the additional recreation components needed to attain the applicable Level of Service standards.

Table 5: Project Costs to Meet Future Demand for Parks and Recreation Components

Component Type	Total Needed	Estimated Cost Per Unit*	Gross Cost Per Unit**	Total Cost (2022)	% Impact Fee Eligible	New Growth Share (2022)	Net Present Value***
Park Acres	0	-	-	-	-	-	-
Recreation Buildings & Supporting Facilities							
Community Centers/Gyms (sq. ft.)	29,772	$ 500.00	$ 610.00	$ 18,160,920.00	100.00%	$ 18,160,920.00	$ 23,136,730.61
Administrative Office Space	894	$ 191.00	$ 233.02	$ 208,319.88	100.00%	$ 208,319.88	$ 265,396.30
Concession Stands	1	$ 35,000.00	$ 42,700.00	$ 42,700.00	40.00%	$ 17,080.00	$ 21,759.66
Restroom Buildings	2	$ 100,000.00	$ 122,000.00	$ 244,000.00	69.50%	$ 169,580.00	$ 216,042.29
Park and Recreation Components							
Baseball Field	3	$ 500,000.00	$ 610,000.00	$ 1,830,000.00	99.33%	$ 1,817,799.39	$ 2,136,620.81
Basketball Court, Outdoor	10	$ 100,000.00	$ 122,000.00	$ 1,220,000.00	93.40%	$ 1,139,480.00	$ 1,339,331.88
Dog Park	1	$ 125,000.00	$ 152,500.00	$ 152,500.00	60.00%	$ 91,500.00	$ 107,548.06
Fishing Pier	1	$ 1,000,000.00	$ 1,220,000.00	$ 1,220,000.00	20.00%	$ 244,000.00	$ 286,794.84
Multi-Purpose Field	4	$ 800,000.00	$ 976,000.00	$ 3,904,000.00	79.50%	$ 3,103,680.00	$ 3,648,030.31
Pavilion	7	$ 50,000.00	$ 61,000.00	$ 427,000.00	90.86%	$ 387,959.82	$ 456,003.57
Playground	12	$ 125,000.00	$ 152,500.00	$ 1,830,000.00	97.67%	$ 1,787,300.61	$ 2,100,772.89
Skate Park	2	$ 150,000.00	$ 183,000.00	$ 366,000.00	16.57%	$ 60,661.85	$ 71,301.25
Softball Field	3	$ 500,000.00	$ 610,000.00	$ 1,830,000.00	99.33%	$ 1,817,799.39	$ 2,136,620.81
Splash Pad	2	$ 150,000.00	$ 183,000.00	$ 366,000.00	89.50%	$ 327,570.00	$ 385,022.07
Swimming Pool	1	$ 3,000,000.00	$ 3,660,000.00	$ 3,660,000.00	100.00%	$ 3,660,000.00	$ 4,301,922.54
Tennis Court	7	$ 80,000.00	$ 97,600.00	$ 683,200.00	99.29%	$ 678,319.90	$ 797,289.53
Volleyball Court, Outdoor	1	$ 30,000.00	$ 36,600.00	$ 36,600.00	20.00%	$ 7,320.00	$ 8,603.85
Park Trails	1.55	$ 300,000.00	$ 366,000.00	$ 567,300.00	100.00%	$ 567,300.00	$ 666,797.99
				$ 36,748,539.88		***$ 34,246,590.84***	***$ 42,082,589.24***

* Sources: City of Savannah (Recreation & Leisure Department, Sustainability Department); comparable facililties in Georgia communities; previous expenditures by the City.

** Includes 22% for contingency and A/E services, with the exception of park acres.

*** Actual implementation dates vary. NPV based on CPI for land, BCI for buildings and CCI for components, in an average construction year of 2032.

Estimated 2022 cost figures are increased to the gross cost by 22% to account for architectural and engineering services as well as contingencies. These 'Total Cost (2022)' figures in the table above are converted to 'New Growth Share (2022)' dollars based on the percentage that each improvement is impact fee eligible (from Table 3).

The Net Present Value of new growth's share of the cost for each component is calculated as follows:

Since the actual pace and timing of construction for the improvements proposed to meet future demand have not been programmed, an 'average' year of 2032 is used for Net Present Value calculations—some improvements will occur earlier for less money, and some later at greater cost. All will average out.

To calculate the Net Present Value (NPV) of the impact fee eligible cost estimate for the construction of the recreation components, the NPVs are calculated by increasing the current (2022) estimated costs using Engineering News Record's (ENR) 10-year average building cost inflation (BCI) rate for buildings (such as gymnasiums) and the 10-year average construction cost inflation (CCI) for all other projects. All project costs are then reduced to current NPV dollars using the Net Discount Rate.

Scheduling Individual Projects and Improvements

Improvements listed on Table 5 cannot be scheduled on an annual basis over the coming 20 years with any certainty. Accordingly, and as noted in the previous section, an 'average' year of 2032 is assigned to all projects in order to calculate estimated project costs. Over the next 5 years, however, specific projects drawn from the table by the City Council are scheduled as part of the annual budget adoption process. These projects are then shown on the Community Work Program, included in this CIE, and may be subsequently updated each year as part of the City's Annual CIE Update report reflecting decisions by City Council regarding capital project funding decisions made during consideration and adoption of that year's annual budget.

■ Trail System

Introduction

The City's Tide to Town trail system is intended to be major component of its overall recreation and parks services. The previous Chapter addressed the City's public parks, including the recreation facilities within the parks, which primarily serve Savannah's residents.

Tide to Town will link neighborhoods, parks, and business centers. Unlike parks and recreational components such as ball fields and community centers that are primarily viewed as 'residential' amenities, a comprehensive trail system is used by residents and local employees alike for walking, jogging, and as access to parks and other destinations. There is thus a clear benefit to businesses as residents access the shops and offices in the city using the walkways and employees take advantage of the walkways to walk or exercise on their time off, to walk to lunch or a shop nearby, or to access local parks or recreation facilities.

This section of the Parks and Recreation chapter focuses on the City's trail system that, by its very nature, will serve both the residential and employee populations.

Service Area

The trail system operates as an interrelated citywide system. Thus, the entire city is considered a single service area.

Level of Service and Forecasts for Service Area

The first phase of Tide to Town, the Truman Trial, is underway. Three miles have been installed, leaving 27 additional miles of the planned Tide to Town system to be installed. This is the length remaining to complete the system for the city's residents and businesses today and for future growth over the coming 20+ years.

Table 6 shows the calculation of the Level of Service (LOS) for the trail system. For these system improvements, the LOS is based on the total day-night population forecasted for 2045 since the entire trail system, as it exists today and is proposed to be expanded, will serve all of the city's residents and businesses collectively by that target year.

Table 6: Level of Service and Forecasts for Service Area

acilities	Service Population	Level of Service		Service Area Growth	New Growth Demand
Planned Miles	Day-Night Population (2045)	Miles Per Person		Day-Night Pop Increase to 2045	Total Miles for New Growth
27	359,244	0.0001		76,871	5.78

To determine the Level of Service, the total length (in miles) of the future system is divided by the day-night population expected to live or work in the city by 2045, resulting in the number of miles per person—resident or employee—that will benefit from the total path system when it is completed.

Applying the City's LOS standard to the increase in the day-night population that is projected for the city by 2045 results in a figure that establishes the maximum number of trail miles that could be included in an impact fee program.

The 'total miles for new growth' figure in Table 6 is determined by multiplying the LOS standard times the day-night population anticipated to be added to the city between 2022 and 2045. The resulting number of miles, 5.78, represents 21.4% of the total 27 miles that are planned to be added to the trail system.

Future Costs

As stated above, 5.78 is the total number of miles that is technically needed to serve new growth and development. While these miles are therefore 100% impact fee eligible, there are 27 total additional miles that are planned to complete the citywide Tide to Town trail system. As such, the '% Impact Fee Eligible' figure below is based on new growth's 'proportional share' of the entire future system (5.78 miles of the total 27 miles to be constructed), which is 21.4% of the length and therefore 21.4% of the cost of the system expansion.

Table 7: Project Costs to Meet Future Demand for Trail Facilities

Year	Faciity	Total Planned Miles	Estimated Cost Per Unit*	Total Cost (2022)**	% Impact Fee Eligible***	New Growth Share (2022)	Net Present Value****
2032	Trail System	27	$3,000,000.00	$16,200,000.00	21.40%	$3,466,474.60	$4,074,454.97

* Source: City of Savannah Sustainability Department.

** Represents the City's ancitipated share (20%) of the overall project cost.

*** Based on the number of impact fee eligible miles (5.78) divided by the total number of planned miles.

**** NPV based on CCI in an average construction year of 2032.

The Net Present Value of new growth's share of the cost for each component is calculated as follows:

Since the actual pace and timing of construction for the entire trail system proposed to meet future demand have not been programmed, an 'average' year of 2032 is used for Net Present Value calculations—some portions of the trial will be constructed earlier for less money, and some later at greater cost. All will average out.

To calculate the Net Present Value (NPV) of the impact fee eligible cost estimate for the construction of the trail system, the NPV is calculated by increasing the current (2022) estimated costs using the 10-year average construction cost inflation (CCI). All project costs are then reduced to current NPV dollars using the Net Discount Rate.

Fire Protection

Introduction

Fire protection services are provided by the City through its Fire Rescue Department (more commonly known as the Savannah Fire Department or SFD). The SFD is organized into three primary divisions: Operations, Logistics and Emergency Management. Altogether, services provided by the SFD include fire suppression, hazardous material mitigation, technical rescues, Emergency Medical Services (EMS), fire education and prevention, fire investigations, emergency management preparedness, and mitigation, response and recovery operations.

Service Area

The city is considered a single service area for the provision of fire protection services because all residents and employees in Savannah have equal access to the benefits of the services provided.

Level of Service and Forecasts for Service Area

'Level of Service' (LOS) is the relationship between service capacity and service demand for public facilities. The LOS for fire protection services in Savannah is measured in terms of the number of square feet of building area (fire stations and training facilities) and the number of fire apparatus (heavy vehicles) and supporting vehicles that serve the day-night population in the service area. Day-night population is used as a measure in that fire protection is a 24-hour service provided continuously to both residences and businesses in the service area. The following table presents the current inventory of SFD facilities and vehicles.

Table 8: Inventory of Existing Building Area and Vehicles

Existing Fire Stations and Facilities		
Name	**Location**	**Floor Area**
Station 1 / Paulsen Street Station	535 E. 63rd Street	5,508
Station 2 / Lorwood Station	5 Skyline Drive	4,461
Station 3 / Headquarters	121 E. Oglethorpe Avenue	7,590
Station 4 / Augusta Avenue Station	2401 Augusta Avenue	5,625
Station 5 / Fire Investigations & Fire Marshal	10 West 33rd	16,786
Station 6 / Paulsen Street Station	3000 Liberty Parkway	9,474
Station 7 / Eisenhour Station	6902 Sallie Mood Drive	4,650
Station 8 / Bee Road Station	2824 Bee Road	4,576
Station 9 / Pine Gardens Station	2235 Capital Street	13,826
Station 10 / Coffee Bluff Station	13710 Coffee Bluff Road	2,840
Station 11 / Savannah Mall Station	11844 Apache Avenue	10,320
Station 12 / Bradley Point Station	1205 Bradley Blvd	9,600
Station 13 / Airport Station	11 McKenna Drive	9,600
Station 14 / Highlands Station	480 Highlands Blvd	9,680
Station 15 / Sweetwater Station	1751 Grove Point Road	9,600
Fire Training Academy	380 Agonic Road	9,100
Training Tower	380 Agonic Road	1,800
Burn Building	380 Agonic Road	1,800
Total Existing Square Footage		**136,836**

Existing Vehicles*	
Type and Number	
Fire Apparatus	
Pumper	24
Aerial	8
Rescue	4
Air/Light	1
Hazmat	1
IFE Truck	2
Marine	2
Total Existing Fire Apparatus	**42**
Support Fleet	
Arson Investigation	1
Brush Truck	2
Fire Chief SUV	6
Fire Marshal Truck	6
Service Support Center Van	1
Training Van	2
Specialized Support Truck	14
Total Existing Support Fleet	**32**

* Vehicles having a service life of 10 years or more.

Currently, fire protection is provided by facilities with a combined square footage of 136,836, utilizing a total of 42 fire apparatus and an additional 32 vehicles that support the operations of the SFD. Future proposals to provide adequate fire protection services citywide include 6 new fire stations strategically located throughout the city. As the city grows, these stations will be needed to maintain and possibly increase service and decrease response times. The future system to be achieved by 2045, as currently envisioned, is summarized on the table below.

Table 9: Planned System Improvements

Additional Fire Station and Facility Space		Additional Fire Apparatus					Additional Support Fleet	
Name	Floor Area	Pumper	Aerial	Rescue	Marine	Total	Type and Number	
Palms Station	10,000	1				1	Responder Truck	1
Bush Road Station	10,000	1				1	Quick Response Vehicle (QRV)	6
New Hampstead Station*	14,000	1	1			2	Utility Task Vehicle (UTV)	4
Hutchinson Island Station*	14,000	1	1			2	Hazmat Container Hauler	2
Jimmy DeLoach Station*	14,000	1		1		2	Mobile Fuel Trailer	1
Chatham Parkway Station	10,000	1	1			2	Service Support Center Forklift	1
Training Tower Replacement**	7,200					0	**Total Additional Support Fleet**	**15**
Burn Building Replacement**	3,200					0		
					1	1		
Total Additional Square Footage	**82,400**	**Total Additional Fire Apparatus**				**11**		

* Proposed public safety building that will contain fire and police functions. The square footage reflects the portion of the total area (20,000 sq.ft.) in the building to be occupied by the Fire Department.

** The square footage shown is the increase in size between the existing and replacement structure. The training tower replacement project will be a total of 9,000 sq.ft, and the burn building replacement will be 5,000 sq.ft.

Table 9 includes the construction of 6 fire stations and the acquisition of fire apparatus for those stations. Three of the stations are proposed to occupy space (approximately 70%) in 'public safety buildings' that will also include space for police functions. In addition, enhancements to training facilities are identified as future needs. These include replacements of the existing fire training tower and burn building with larger structures. As noted in the table, the square footage reflects only the addition of building area relative to the existing structure size; the 'replacement' space (i.e., the existing square footage shown in Table 8) is excluded. Fifteen support vehicles are also proposed to be added to the Fire Department's fleet.

Table 10 presents the calculation of the Level of Service (LOS) for the system as proposed to fully serve the city over the next 23 years. These LOS figures are based on the future 2045 day-night population. This is because the existing building area and vehicles utilized by the Fire Department (see Table 8), combined with the proposed additional square footage and vehicles identified on Table 9, are expected to serve the current and future population to 2045. These combined figures are shown under the 'Facilities' column in Table 10, and they are divided by the 'Service Population' (the 2045 day-night population) to calculate the Level of Service for square feet and all vehicles.

Table 10: Level of Service and New Growth Demand

Facilities	Service Population	Level of Service	Future Service Population	New Growth Demand*
Existing & Planned Square Feet	2045 Day-Night Population	Square Feet per 2045 Day-Night Population	Day-Night Population Increase (2022-45)	Net New Square Feet Demanded
219,236	359,244	0.610270	76,871	46,912
Existing & Planned Fire Apparatus	2045 Day-Night Population	Fire Apparatus per 2045 Day-Night Population	Day-Night Population Increase (2022-45)	Net New Apparatus Demanded
53	359,244	0.000148	76,871	11.34
Existing & Planned Support Fleet	2045 Day-Night Population	Support Fleet per 2045 Day-Night Population	Day-Night Population Increase (2022-45)	Net New Support Fleet Demanded
47	359,244	0.000131	76,871	10.06

* 11 fire apparatus will be added to the inventory, all of which are 100% eligible for impact fee funding. 10 support vehicles will be added at 100% impact fee eligibility.

Table 10 also shows the fire protection facilities that are needed to serve new growth in 2045. These 'New Growth Demand' figures show the actual number of building area (square feet), fire apparatus, and support vehicles, that are 'demanded' by new growth. New growth is defined and quantified as the increase in population from 2022 to 2045, which is also known as the 'Future Service Population' above.

Using the future-system approach to determine new growth demand, only 46,912 square feet in additional building area is needed to serve future growth. This reveals a shortfall in space serving the current day-night population. Thus, of the total 82,400 square feet in space proposed (see Table 9), only 46,912 square feet can be supported with impact fees (57% of the total proposed), leaving the remaining 35,488 square feet (44%) to be funded by the existing tax base.

This same principle applies to the fire apparatus and supporting fleet in Table 10. New growth only requires 11.34 and 10.06 vehicles, respectively. But since a portion of a vehicle cannot be acquired, the numbers are rounded to whole vehicles. As noted in the table, 11 new fire apparatus will be acquired. This number is slightly less than what is technically required to meet the demand for the future system and is therefore 100% impact fee eligible. In addition, 10 support vehicles will be added to the Fire Department's fleet, all of which are also fully impact fee eligible.

Future Costs

There are three categories of future costs: those for needed building area, those for fire apparatus, and those for support vehicles. The estimated improvement cost for needed building area (in 2022 dollars) are based on prevailing construction costs for fire stations. This per square foot dollar amount ($351) is applied to the 46,912 square feet for 'new building area'.

Should the City undertake the burn building or training tower replacement projects, it is important to note that the projects are not fully impact fee eligible. The impact fee eligible portion is the increase in size from the existing structure to the new replacement structure, since it is these additional square feet that are needed to meet future demand. Based on the existing and proposed sizes of the replacement buildings, the new burn building (5,000 square feet) would be 64% impact fee eligible (3,200 – see Table 9– divided by 5,000). The proposed 9,000 square feet training tower would be 80% impact fee eligible (7,200 square feet in additional square feet relative to the existing 1,800 square feet structure, divided by 9,000).

Vehicle costs are based on prevailing rates for similar vehicles equipped to local specifications.

Table 11: Project Costs to Meet Future Demand

Description	Number	2022 Cost Each*	Total 2022 Cost	Estimated Cost 2032 (NPV)**	% Impact Fee Eligible	Total Impact Fee Eligible Cost
New Building Area (sq.ft.)	46,912	$ 351.00	$ 16,466,147.20	$ 20,977,616.33	100%	$ 20,977,616.33
New Fire Apparatus	11	$ 1,181,818.18	$ 13,000,000.00	$ 16,771,893.63	100%	$ 16,771,893.63
New Support Fleet	10	$ 58,066.67	$ 580,666.67	$ 749,144.58	100%	$ 749,144.58
	Totals	**$ 1,240,235.85**	**$ 30,046,813.87**	**$ 38,498,654.54**		**$ 38,498,654.54**

*Building cost estimates information provided by the Savannah Fire Department. Vehicle costs based on current prevailing rates for fire apparatus and supporting vehicles equipped to local specifications.

**2022 cost estimate inflated to 'average' year (2032) using the CPI or BCI, as applicable, reduced to NPV using the Discount Rate.

The Net Present Value (NPV) of new growth's share ('% Impact Fee Eligible') of the costs for future improvements is calculated as follows:

Since the exact pace and timing of construction for the additional square footage and the purchase of vehicles proposed to meet future demand cannot be programmed with certainty for each year between now and 2045, an 'average' year of 2032 is used for Net Present Value calculations—some improvements will occur earlier for less money, and some later at greater cost. All will average out.

To calculate the NPV of the impact fee eligible cost estimate for the construction of the new floor area, the NPV is calculated by increasing the current (2022) estimated cost using Engineering News Record's 10-year average building cost inflation (BCI) rate. The projected costs are then reduced to current NPV dollars using the Net Discount Rate (see Appendix D: *Cost Adjustments and Credits*).

The NPV of the cost for all vehicles is calculated by increasing the current (2022) estimated cost using the Consumer Price Index (CPI) rate. The projected costs are then reduced to current NPV dollars using the Net Discount Rate.

Scheduling Individual Capital Projects

As noted above, exact project details and implementation years cannot be identified with certainty over the next two decades. The table below reflects a tentative program of system improvements, drawn from Table 11, scheduled in pace with annual demands generated by population and business growth. Actual implementation dates will be determined through the annual budget adoption process. In addition, the number of new or expanded facilities – and the size of each – may vary from what is shown below. Regardless of the future building configurations, the additional building area is fully impact fee eligible as long as the total does not exceed 46,912 square feet.

Table 12: Schedule of Fire Department Capital Improvements

Year*	Day-Night Population		Facility Addition (sf)**	Additional Vehicles		% Impact Fee Eligible***
	Total	Cumulative Additions		Fire Trucks	Support Fleet	
2022	282,373					
2023	285,786	3,413			1	100%
2024	289,200	6,827				
2025	292,614	10,241	9,382	2	1	100%
2026	296,031	13,658		1		100%
2027	299,438	17,065			1	100%
2028	302,853	20,480				
2029	306,266	23,893	9,382	2	1	100%
2030	309,678	27,305				
2031	313,008	30,635			1	100%
2032	316,340	33,967	9,382	2		100%
2033	319,671	37,298			1	100%
2034	323,002	40,629				
2035	326,336	43,963			1	100%
2036	329,659	47,286	9,382	2		100%
2037	332,991	50,618			1	100%
2038	336,322	53,949				
2039	339,654	57,281			1	100%
2040	342,983	60,610	9,382	2		100%
2041	346,235	63,862				
2042	349,488	67,115			1	100%
2043	352,739	70,366				
2044	355,993	73,620				
2045	359,244	76,871				
Totals			**46,912**	**11**	**10**	

*Actual implementation dates will be determined through the annual budget adoption process.
**The number of facilities and size of each may vary.
***The total building area of all new facilities combined cannot exceed 46,912 sf in order to be eliigble for funding with impact fees.

Law Enforcement

Introduction

Law enforcement services are provided by the City through the Savannah Police Department (SPD). The SPD is organized into three primary divisions (Field Operations, Criminal Investigations, and Administrative and Management Services) and consists of four precincts (Northwest, Southside, Eastside, and Central).

Service Area

The city is considered a single service area for the provision of law enforcement services because all residents and employees in Savannah have equal access to the benefits of the services provided.

Level of Service and Forecasts for Service Area

'Level of Service' (LOS) is the relationship between service capacity and service demand for public facilities. The LOS for law enforcement services in Savannah is measured in terms of the number of square feet of building area and the number of specialized vehicles that serve the day-night population in the service area. Day-night population is used as a measure in that law enforcement is a 24-hour service provided continuously to both residences and businesses in the service area. The following table presents the current inventory of SPD facilities and vehicles.

Table 13: Inventory of Existing Building Area and Vehicles

Description	Location	Quantity
Building Area		*Square Feet*
Police Headquarters	201 Habersham	33,000
Central Precinct	1710 Martin Luther King Jr. Blvd.	13,300
Eastside Precinct	2250 Victory Drive	9,608
Southside Precinct	7804 Abercorn St.	5,100
Northwest Precinct	602 E. Lathrop Ave.	28,810
Northwest Substation	Armestead Ave. (Savannah Airport)	1,100
Property and Evidence Building	78 Ross Road	6,021
Vehicle Forensics Processing Garage	78 Ross Road	2,400
Garage for Specialized Vehicles	78 Ross Road	5,000
Professional Development Training	3401 Edwin Street	20,000
	Total Square Feet	**124,339**
Specialized Vehicles*		*Number*
Armored Vehicle		1
Mounted Patrol Trailer		1
Specialized Unit Equipment Trailer		3
	Total Specialized Vehicles	**5**

* Vehicles having a service life of 10 years or more.

Table 14 presents the calculation of the current Level of Service (LOS) standards for law enforcement system facilities (building area and specialized vehicles) in the city. The inventory of each category is divided by the current (2022) day-night population to obtain the LOS per person enjoyed throughout the city.

Table 14: Level of Service and New Growth Demand

Facilities	Current Service Population	Level of Service	Service Area Growth	New Growth Demand
Existing Square Feet	**Day-Night Population (2022)**	**Square Feet of Floor Area per Person**	**Day-Night Pop Increase to 2045**	**Square Feet of New Floor Area Needed**
124,339	282,373	0.4403	76,871	33,849
Existing Specialized Vehicles	**Day-Night Population (2022)**	**Vehicle per Person**	**Day-Night Pop Increase to 2045**	**New Specialized Vehicles Needed***
5	282,373	0.000018	76,871	1.36

* Two vehicles will be purchased: one that is 100% impact fee eligible and a second that is 36% impact fee eligible.

Table 14 also shows the law enforcement facilities that are needed to serve new growth in 2045. For the purposes of impact fee calculations, the City has determined that a Level of Service, based on the current LOS (i.e., the portions of existing building area and vehicles that serve one person today), would be appropriate to serve the future service area population.

In the table, the building area (square feet), and specialized vehicle LOS standards are next multiplied by the forecasted citywide day-night population increase to produce the expected demand that future growth and development will place on the city. This 'demand' equates to 33,849 square feet in additional building area and 1.36 additional specialized vehicles. Since only whole vehicles can be purchased, this number is rounded up and will result in the addition of two vehicles to cover expansion of the existing fleet. However, since only 1.36 vehicles are technically needed to serve new growth, the second vehicle only be partially (36%) impact fee eligible.

The building area required to meet the demands of new growth – 33,849 square feet – is 100% impact fee eligible. The square footage may be allocated across future projects that add building area, as follows: expansion of an existing building, construction of a new building (such as a garage or an additional precinct or substation), and/or replacement of an existing building. It should be noted that building replacement projects are impact fee eligible to the extent that the new building adds square footage to the existing building footprint. By way of example, if the existing 2,400 square feet vehicle forensics processing garage is replaced by a 4,000 square feet garage, the difference between the two (1,600 square feet) is what is impact eligible. This results in the new garage being 40% (1,600 divided by 4,000) impact fee eligible. The other 60% percent of the project cost would

have to come from other funding sources. Building replacement projects that result in the same or smaller building size are not impact fee eligible.

Future Costs

There are two categories of future costs: those for needed building area and those for specialized vehicles. The estimated improvement cost for needed building area (in 2022 dollars) is based on recent police precinct construction in the city. This per square foot dollar amount ($669) is applied to the 33,849 square feet for 'new building area'. Vehicle costs are based on prevailing rates for similar vehicles equipped to local specifications.

Table 15: Facility Costs to Meet Future Demand

Description	Number	Unit Cost*	Total Cost	% Impact Fee Eligible	Total Impact Fee Eligible	Net Present Value**
Future Building Area (sq.ft.)	33,849	$ 669.00	$ 22,644,981.00	100%	$ 22,644,981.00	$ 31,783,503.14
Specialized Vehicle 1	1	$ 162,500.00	$ 162,500.00	100%	$ 162,500.00	$ 209,648.67
Specialized Vehicle 2	1	$ 162,500.00	$ 162,500.00	36%	$ 58,500.00	$ 75,473.52
Totals			**$ 22,969,981.00**		**$ 22,865,981.00**	**$ 32,068,625.33**

* Source: Savannah Police Department. Floor area cost estimates based on recent SPD police precinct construction costs. Vehicle costs are estimated using the average of current prevailing rates for existing specialized vehicles in the city's fleet.

** NPV for building area based on the 2018 construction costs of the Central Precinct. NPV for building area and vehicle based on 10-year average annual Building Cost Inflation (BCI) and Consumer Price Index (CPI), respectively, projected to an 'average' year of 2032.

The Net Present Value (NPV) of new growth's share ('% Impact Fee Eligible') of the costs for future improvements is calculated as follows:

Since the actual pace and timing of construction for the additional square footage and the purchase of vehicles proposed to meet future demand have not been programmed, an 'average' year of 2032 is used for Net Present Value calculations—some improvements will occur earlier for less money, and some later at greater cost. All will average out.

To calculate the NPV of the impact fee eligible cost estimate for the construction of the new floor area, the NPV is calculated by increasing the current (2022) estimated cost using Engineering News Record's 10-year average building cost inflation (BCI) rate. The projected costs are then reduced to current NPV dollars using the Net Discount Rate (see Appendix D: *Cost Adjustments and Credits*).

The NPV of the cost for all vehicles is calculated by increasing the current (2022) estimated cost using the Consumer Price Index (CPI) rate. The projected costs are then reduced to current NPV dollars using the Net Discount Rate.

Scheduling Individual Capital Projects

As noted above, exact project details and implementation years cannot be identified with certainty over the next two decades. The table below reflects a tentative program of system improvements, drawn from Table 15, scheduled in pace with annual demands generated by population and business growth. Actual implementation dates will be determined through the annual budget adoption process. In addition, the number of new or expanded facilities – and the size of each – may vary from what is shown below. Regardless of the future building configurations, the additional building area is fully impact fee eligible as long as the total does not exceed 33,849 square feet.

Table 16: Schedule of Police Department Capital Improvements

Year*	Day-Night Population		Facility Addition (sf)**	Additional Vehicles	% Impact Fee Eligible***
	Total	Cumulative Additions			
2022	282,373				
2023	285,786	3,413		1	100%
2024	289,200	6,827		1	36%
2025	292,614	10,241	6,770		100%
2026	296,031	13,658			
2027	299,438	17,065			
2028	302,853	20,480			
2029	306,266	23,893	6,770		100%
2030	309,678	27,305			
2031	313,008	30,635			
2032	316,340	33,967	6,770		100%
2033	319,671	37,298			
2034	323,002	40,629			
2035	326,336	43,963			
2036	329,659	47,286	6,770		100%
2037	332,991	50,618			
2038	336,322	53,949			
2039	339,654	57,281			
2040	342,983	60,610	6,770		100%
2041	346,235	63,862			
2042	349,488	67,115			
2043	352,739	70,366			
2044	355,993	73,620			
2045	359,244	76,871			
Totals			**33,849**	**2**	

*Actual implementation dates will be determined through the annual budget adoption process.

** The number of facilities and size of each may vary.

***The total building area of all new facilities combined cannot exceed 33,849 sf in order to be eliigble for funding with impact fees.

Road Improvements

Introduction

The information in this chapter is derived from road project information reflecting proposed road improvement projects that create new capacity.

Service Area

The service area for these road projects is defined as the entire city, in that these projects are recognized as providing primary access to all properties within the city as part of the citywide network of principal streets and thoroughfares. All new development within the city will be served by this citywide network, such that improvements to any part of this network to relieve congestion or to otherwise improve capacity will positively affect capacity and reduce congestion throughout the city.

Level of Service

For impact fee purposes, the City has set its Level of Service for road improvements at LOS "C" for corridors. For intersections, LOS "D" is set for intersections unless the current level is "A", "B" or "C" for a particular intersection and new development will drop the LOS more than one letter grade or one or more of the intersection approaches to below LOS "D". Using this LOS maximizes roadway capacity before traffic conditions actually break down (LOS "F"). See the Level of Service Standards section below for a description of these levels.

All road improvement projects benefit existing and future traffic proportionally to the extent that relief from over-capacity conditions eases traffic problems for everyone. For example, since new growth by 2045 will represent a certain portion of all 2045 traffic, new growth would be responsible for that portions' cost of the road improvements.

It is noted that the cost-impact of non-Savannah generated traffic on the roads traversing the city ('through' traffic) is off-set by state and federal assistance. The net cost of the road projects that accrues to Savannah reasonably represents (i.e., is 'roughly proportional' to) the impact on the roads by Savannah residents driving to and from their homes, commuters that come in to work in the city, and those coming into Savannah to shop, do business or recreate.

The basis for the road impact fee would therefore be Savannah's cost for the improvements divided by all traffic generated within the city in 2045 (existing today plus new growth)—i.e., the cost per trip—times the traffic generated by new growth alone. For an individual land use, when a building permit is issued, the cost per trip would be applied to the number of trips that will be generated by the new development, assuring that new growth would only pay its 'fair share' of the road improvements that serve it.

Level of Service Standards

Level of Service (LOS) for roadways and intersections is measured on a 'letter grade' system that rates a road within a range of service from A to F. Level of Service A is the best rating, representing roads operating with unencumbered travel; Level of Service F is the worst rating, representing operational conditions of heavy congestion and long delays. This system is a means of relating the connection between speed and travel time, freedom to maneuver, traffic interruption, comfort, convenience and safety to the capacity that exists in a roadway. This refers to both a quantitative measure expressed as a service flow rate and an assigned qualitative measure describing parameters. The

Highway Capacity Manual, Special Report 209, Transportation Research Board (1985), defines operational design Level of Service A through F as having the following characteristics:

1. LOS A: free flow, excellent level of freedom and comfort;
2. LOS B: stable flow, decline in freedom to maneuver, desired speed is relatively unaffected;
3. LOS C: stable flow, but marks the beginning of users becoming affected by others, selection of speed and maneuvering becomes difficult, comfort declines at this level;
4. LOS D: high density, but stable flow, speed and freedom to maneuver are severely restricted, poor level of comfort, small increases in traffic flow will cause operational problems;
5. LOS E: at or near capacity level, speeds reduced to low but uniform level, maneuvering is extremely difficult, comfort level poor, frustration high, level unstable; and
6. LOS F: forced/breakdown of flow. The amount of traffic approaching a point exceeds the amount that can transverse the point. Queues form, stop & go. Arrival flow exceeds discharge flow.

The traffic volume that produces different Level of Service grades differs according to road type, size, signalization, topography, condition and access.

Forecasts for Service Area

Projects that provide road capacity that will serve new growth have been identified by the City and are shown on the following table. This is not a list of all City road projects. These projects were selected for inclusion in the City's impact fee program because the specific improvements proposed will increase traffic capacity and reduce congestion to some extent, whether through road widening, improved intersection operations or upgraded signalization.

Table 17: Road Projects and Eligible Costs

Project Description	Total City Cost*	Year of Completion	Net Present Value**	% Impact Fee Eligible***	New Growth Cost (NPV)
Stiles Ave. Widening Phase 2	$ 5,000,000.00	2023	$ 5,081,455.82	25.3%	$ 1,285,809.88
Louisville / MLK Intersection Improvement	$ 270,000.00	2024	$ 278,868.89	25.3%	$ 70,564.89
Benton Blvd. Widening Phase 1	$ 12,500,000.00	2028	$ 13,772,694.47	25.3%	$ 3,485,038.01
Benton Blvd. Widening Phase 2	$ 14,000,000.00	2028	$ 15,425,417.81	25.3%	$ 3,903,242.57
Skidaway Rd. Widening	$ 15,000,000.00	2028	$ 16,527,233.36	25.3%	$ 4,182,045.61
Highlands Blvd. Widening	$ 10,000,000.00	2028	$ 11,018,155.58	25.3%	$ 2,788,030.41
Gwinnett Street EB & SB Lanes & Signal Upgrade @I-16	$ 1,600,000.00	2032	$ 1,880,621.87	25.3%	$ 475,871.93
Gwinnett Street NB Lane Extension/ Additional Left & Right Turn lanes @ I-16	$ 2,000,000.00	2032	$ 2,350,777.34	25.3%	$ 594,839.91
Gwinnett Street NB Turn Lane & Traffic Signal @ I-516	$ 1,000,000.00	2032	$ 1,175,388.67	25.3%	$ 297,419.96
Jimmy DeLoach Pkwy. Widening	$ 5,000,000.00	2032	$ 5,876,943.36	25.3%	$ 1,487,099.78
Louisville Rd. Widening	$ 8,000,000.00	2032	$ 9,403,109.37	25.3%	$ 2,379,359.65
Louisville Rd. @ US 17 NB Off-Ramp & Traffic Signal	$ 1,000,000.00	2032	$ 1,175,388.67	25.3%	$ 297,419.96
Derenne Ave. Operational Improvements & New Roadway	$ 11,937,951.00	2034	$ 14,492,642.94	25.3%	$ 3,667,213.53
Total	**$ 87,307,951.00**		**$ 98,458,698.15**		**$ 24,913,956.09**

* Total estimated cost of project in 2022 dollars less non-City assistance.
** Net Present Value = current cost inflated to target year using the ENR Construction Cost Index, (CCI) reduced to NPV using the Discount Rate.
*** See the *Trip Generation* section in the Appendix. Actual % of trips: 25.3%

The cost figures shown in Table 17 above are in current (2022) dollars and are then calculated in Net Present Value (as discussed in Appendix D: Cost Adjustments and Credits) and shown in the 'Net Present Value' column, based on the anticipated year of project expenditure.

As discussed thoroughly in Appendix C: Traffic Demand, new growth and development will represent 25.2% of the traffic on Savannah's road network in 2045. To that extent, new growth's fair share of the road project costs that are attributed to new growth are shown in the last two columns of Table 17 on the previous page.

Community Work Program

2023-2027

5-Year Work Program: Impact Fee Eligible Projects

Category	Action/Item	2023	2024	2025	2026	2027	Responsible City Party	Cost Estimate*	Funding Source**	Notes
Parks and Recreation	Southside Community Center	✓					Recreation & Leisure Services Department	$6,100,000	Up to 100% Impact Fees; Local Taxation Sources	New 10,000 square foot facility
Parks and Recreation	Skate Park	✓					Recreation & Leisure Services Department	$183,000	Up to 16.57% Impact Fees; Local Taxation Sources	
Parks and Recreation	Splash Pads (2)	✓					Recreation & Leisure Services Department	$366,000	Up to 89.50% Impact Fees; Local Taxation Sources	
Parks and Recreation	Playground	✓					Recreation & Leisure Services Department	$152,500	Up to 97.67% Impact Fees; Local Taxation Sources	
Parks and Recreation	Trail System	✓	✓	✓	✓	✓	Sustainability Depart-ment	$600,000 / mile	Up to 21.40% Impact Fees; Local Taxation Sources	# of miles constructed per year is TBD
Fire Protection	New Hampstead Station (new)	✓					Fire Department	$4,914,000	Up to 100% Impact Fees; Local Taxation Sources	New 14,000 square foot facility
Fire Protection	Pumper Truck	✓					Fire Department	$750,000	Up to 100% Impact Fees; Local Taxation Sources	For New Hampstead FS
Fire Protection	Aerial Truck	✓					Fire Department	$1,500,000	Up to 100% Impact Fees; Local Taxation Sources	For New Hampstead FS
Fire Protection	Quick Response Vehicles (2)	✓					Fire Department	$106,000	Up to 100% Impact Fees; Local Taxation Sources	
Fire Protection	Utility Task Vehicle (2)	✓					Fire Department	$84,000	Up to 100% Impact Fees; Local Taxation Sources	

Category	Action/Item	2023	2024	2025	2026	2027	Responsible City Party	Cost Estimate*	Funding Source**	Notes
Fire Protection	Service Support Center Forklift	✓					Fire Department	$50,000	Up to 100% Impact Fees; Local Taxation Sources	
Fire Protection	Mobile Fuel Trailer		✓				Fire Department	$25,000	Up to 100% Impact Fees; Local Taxation Sources	
Fire Protection	Hutchinson Island Station (new)			✓			Fire Department	$4,914,000	Up to 100% Impact Fees; Local Taxation Sources	New 14,000 square foot facility
Fire Protection	Pumper Truck			✓			Fire Department	$750,000	Up to 100% Impact Fees; Local Taxation Sources	For Hutchinson Island FS
Fire Protection	Aerial Truck			✓			Fire Department	$1,500,000	Up to 100% Impact Fees; Local Taxation Sources	For Hutchinson Island FS
Fire Protection	Responder Truck			✓			Fire Department	$60,000	Up to 100% Impact Fees; Local Taxation Sources	
Fire Protection	Palms Station (new)				✓		Fire Department	$3,510,000	Up to 100% Impact Fees; Local Taxation Sources	New 10,000 square foot facility
Fire Protection	Pumper Truck				✓		Fire Department	$750,000	Up to 100% Impact Fees; Local Taxation Sources	For Palms FS
Fire Protection	Hazmat Container Hauler				✓		Fire Department	$125,000	Up to 100% Impact Fees; Local Taxation Sources	
Law Enforcement	Mounted Patrol Trailer	✓					Police Department	$50,000	Up to 36% Impact Fees; Local Taxation Sources	
Law Enforcement	SWAT Vehicle		✓				Police Department	$270,000	Up to 100% Impact Fees; Local Taxation Sources	
Law Enforcement	Northwest Substation (replacement)		✓				Police Department	$2,528,000	Up to 27.50% Impact Fees; Local Taxation Sources	% that may be funded with impact fees based on difference between existing (1,100 sf) and proposed building size (4,000 sf)

Category	Action/Item	2023	2024	2025	2026	2027	Responsible City Party	Cost Estimate*	Funding Source**	Notes
Law Enforcement	Southside Substation (new)		✓				Police Department	$2,528,000	Up to 100% Impact Fees; Local Taxation Sources	New 4,000 square foot facility
Law Enforcement	Southside Precinct (replacement)		✓				Police Department	$8,697,000	Up to 39.23% Impact Fees; Local Taxation Sources	% that may be funded with impact fees based on difference between existing (5,100 sf) and proposed building size (13,000 sf) Actual construction date(s) may vary based on the terms of current lease arrangements
Law Enforcement	Eastside Precinct (replacement)			✓			Police Department	$8,697,000	Up to 73.91% Impact Fees; Local Taxation Sources	% that may be funded with impact fees based on difference between existing (9,608 sf) and proposed building size (13,000 sf) Actual construction date(s) may vary based on the terms of current lease arrangements
Law Enforcement	Northwest Precinct (replacement)			✓			Police Department	TBD	Impact Fees; Local Taxation Sources	% that may be funded with impact fees to be based on the difference between existing (28,810 sf) and proposed building size (TBD) Actual construction date(s) may vary based on the terms of current lease arrangements
Road Improvements	Stiles Ave. Widening Phase 2	✓					Traffic Engineering Department	$5,000,000	Up to 25.3% Impact Fees; Local Taxation Sources	
Road Improvements	Louisville / MLK Intersection Improvement		✓				Traffic Engineering Department	$270,000	Up to 25.3% Impact Fees; Local Taxation Sources	

* Building cost estimates based on unit costs in the respective public facility chapter of this CIE; actual costs may vary

** Local Taxation Sources include but are not limited to the City General Fund, SPLOST, or other City taxation sources, as determined during the annual budget adoption process

Glossary

The following terms are used in this and other impact fee reports. Where possible, the definitions are taken directly from the Development Impact Fee Act.

Definitions

Capital improvement: an improvement with a useful life of ten years or more, by new construction or other action, which increases the service capacity of a public facility.

Capital Improvements Element: a component of a comprehensive plan adopted pursuant to Chapter 70 of the Development Impact Fee Act which sets out projected needs for system improvements during a planning horizon established in the comprehensive plan, a schedule of capital improvements that will meet the anticipated need for system improvements, and a description of anticipated funding sources for each required improvement.

DCA: The Georgia Department of Community Affairs.

Development: any construction or expansion of a building, structure, or use, any change in use of a building or structure, or any change in the use of land, any of which creates additional demand and need for public facilities.

Development impact fee: a payment of money imposed upon development as a condition of development approval to pay for a proportionate share of the cost of system improvements needed to serve new growth and development.

Eligible facilities: capital improvements in one of the following categories:

(A) Water supply production, treatment, and distribution facilities;

(B) Waste-water collection, treatment, and disposal facilities;

(C) Roads, streets, and bridges, including rights of way, traffic signals, landscaping, and any local components of state or federal highways;

(D) Storm-water collection, retention, detention, treatment, and disposal facilities, flood control facilities, and bank and shore protection and enhancement improvements;

(E) Parks, open space, and recreation areas and related facilities;

(F) Public safety facilities, including police, fire, emergency medical, and rescue facilities; and

(G) Libraries and related facilities.

Impact cost: the proportionate share of capital improvements costs to provide service to new growth, less any applicable credits.

Impact fee: the impact cost plus surcharges for program administration and recoupment of the cost to prepare the Capital Improvements Element.

Level of service: a measure of the relationship between service capacity and service demand for public facilities in terms of demand to capacity ratios or the comfort and convenience of use or service of public facilities or both.

Project improvements: site improvements and facilities that are planned and designed to provide service for a particular development project and that are necessary for the use and convenience of the occupants or users of the project and are not system improvements. The character of the

improvement shall control a determination of whether an improvement is a project improvement or system improvement and the physical location of the improvement on site or off site shall not be considered determinative of whether an improvement is a project improvement or a system improvement. If an improvement or facility provides or will provide more than incidental service or facilities capacity to persons other than users or occupants of a particular project, the improvement or facility is a system improvement and shall not be considered a project improvement. No improvement or facility included in a plan for public facilities approved by the governing body of the municipality or county shall be considered a project improvement.

Proportionate share: means that portion of the cost of system improvements which is reasonably related to the service demands and needs of the project.

Rational nexus: the clear and fair relationship between fees charged and services provided.

Service area: a geographic area defined by a municipality, county, or intergovernmental agreement in which a defined set of public facilities provide service to development within the area. Service areas shall be designated on the basis of sound planning or engineering principles or both.

System improvement costs: costs incurred to provide additional public facilities capacity needed to serve new growth and development for planning, design and engineering related thereto, including the cost of constructing or reconstructing system improvements or facility expansions, including but not limited to the construction contract price, surveying and engineering fees, related land acquisition costs (including land purchases, court awards and costs, attorneys' fees, and expert witness fees), and expenses incurred for qualified staff or any qualified engineer, planner, architect, landscape architect, or financial consultant for preparing or updating the capital improvement element, and administrative costs, provided that such administrative costs shall not exceed 3 percent of the total amount of the costs. Projected interest charges and other finance costs may be included if the impact fees are to be used for the payment of principal and interest on bonds, notes, or other financial obligations issued by or on behalf of the municipality or county to finance the capital improvements element but such costs do not include routine and periodic maintenance expenditures, personnel training, and other operating costs.

System improvements: capital improvements that are public facilities and are designed to provide service to the community at large, in contrast to 'project improvements.'

Appendix A: Future Growth Forecasts

In order to accurately calculate the demand for future services for Savannah (and thus the public facilities needed to provide those services), new growth and development must be quantified in future projections. These projections include forecasts for population, households, housing units, and employment to the year 2045. These projections provide the base-line conditions from which the current (2022)[2] or future (2045) Level of Service calculations are produced.

Types of Projections

Accurate projections of population, households, housing units, and employment are important in that:

- Population data and forecasts are used to establish current and future demand for services where the Level of Service (LOS) standards are per capita based.
- Household data and forecasts are used to forecast future growth in the number of housing units.
- Housing unit data and forecasts relate to certain service demands that are household based, such as parks. The number of households—defined as *occupied* housing units—is always smaller than the total number of housing units, which include vacant units. Over time, however, each housing unit is expected to become occupied by a household, even though the unit may become vacant during future re-sales or turnovers.
- Employment forecasts are refined to reflect 'value-added' employment figures. This reflects an exclusion of jobs considered to be transitory or non-site specific in nature, and thus not requiring building permits to operate (i.e., are not assessed impact fees), as well as governmental uses that are not subject to impact fees.
- 'Value-added' employment data is combined with population data to produce what is known as the 'day-night population.' These figures represent the total number of persons receiving services, both in their homes and in their businesses, to produce an accurate picture of the total number of persons that rely on certain 24-hour services, such as fire and police protection.
- The projections used for the parks & recreation and public safety (fire and police) categories are citywide forecasts because these public facility categories are delivered by the City throughout the city.

Note that, for the road improvements public facility category, vehicle trip data is used as the basis for impact fee calculations (presented in Appendix C), although some socioeconomic data from this Appendix are used in those calculations as well.

[2] It is anticipated that the City's impact fee program will be implemented in the Summer of 2022. All data in this Appendix are technically as of July 1 of each year shown, consistent with data reported by the Census Bureau.

Historic Population Growth

Every year, the US Census Bureau estimates the population in Savannah between decennial censuses (e.g., 2000 and 2010). After a decennial census, the Bureau revises the preceding annual estimates based on the actual Census count. Unlike the decennial censuses, which are 'as of' April 1, the annual estimates are 'as of' July 1 of each year. Those annual estimates are shown in Table A-1, adjusted to the 2020 estimated population (as most recently revised in 2022 by the Bureau).

Table A-1: Annual Census Population Estimates

	Population Estimate (as of July 1 each year)										
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	
Savannah	132,895	132,388	132,332	131,391	131,812	131,126	132,259	133,452	133,651	135,734	
	2010*	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Savannah	137,424	144,422	146,410	146,725	148,070	149,429	150,191	150,185	150,272	148,942	147,701

* 2010 estimate revised by Census Bureau in 2020.
Note: All data as of July 1 of each year. 2000, 2010 and 2020 differ from Decennial Census counts, which are as of April 1.
Sources: For 2000 to 2009: *Intercensal Estimates 2000-2010*, US Bureau of the Census. For 2010 to 2020: *Census Annual Estimates Program*, US Bureau of the Census, revised per final released 2020 population.

It should be noted that visitors to the city are not counted as part of the population forecasts, since they are either not staying in the city as residents or are possibly staying in hotels. On the other hand, their visits to the city on a daily basis are captured somewhat in the employment forecasts which address both employees, deliveries and customers as part of the calculations.

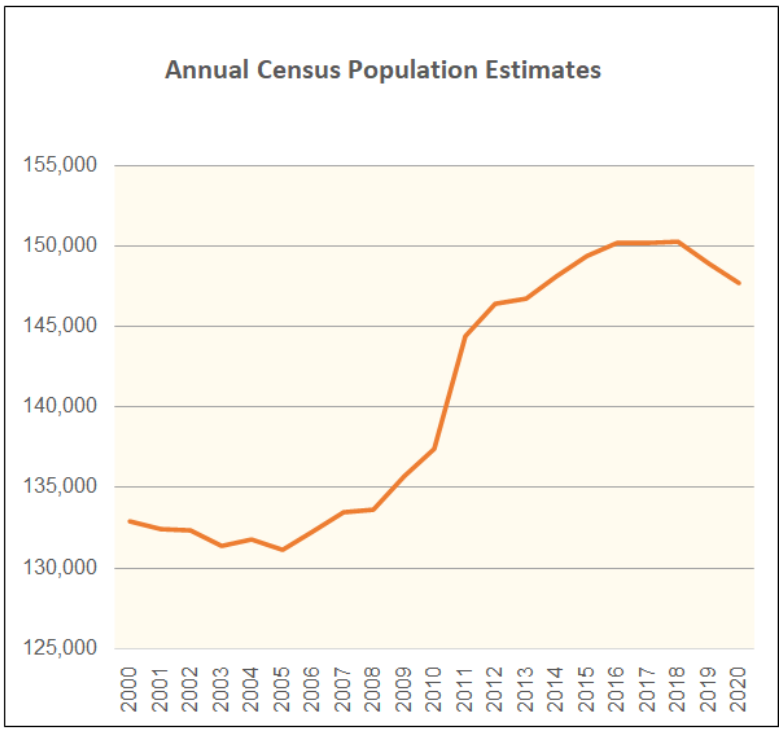
Ultimately, residential impact fees are based on the number of housing units in the city. It makes no difference in the impact fee calculations whether the unit is occupied by a permanent resident, a family that only comes to stay during a particular season, or the use of the unit for visitors staying only a week or so (like an Air B&B). The demand for public services, such as fire and police protection, does not vary by occupancy characteristics such as rental vs. ownership and full-time versus part-time residency.

A close look at the City's population growth year-by-year reveals an interesting trend over the past two decades. Table A-2, below, plots the Census Bureau's annual estimates from the 2000 Census year to 2020. After a minor 'slump' following the 2000 Census that persisted until 2005, the city's population increased every year but one since then until 2018.

Inexplicably, the Census Bureau's estimates for 2019 and 2020 show a loss in population. Inexplicable because the city's population has increased every year since the end of the Great Recession. Nonetheless, this 'downturn' is not expected to persist in the future.

Table A-2: Annual Census Estimated Population

	July 1 Population Estimates
2000	132,895
2001	132,388
2002	132,332
2003	131,391
2004	131,812
2005	131,126
2006	132,259
2007	133,452
2008	133,651
2009	135,734
2010	137,424
2011	144,422
2012	146,410
2013	146,725
2014	148,070
2015	149,429
2016	150,191
2017	150,185
2018	150,272
2019	148,942
2020	147,701



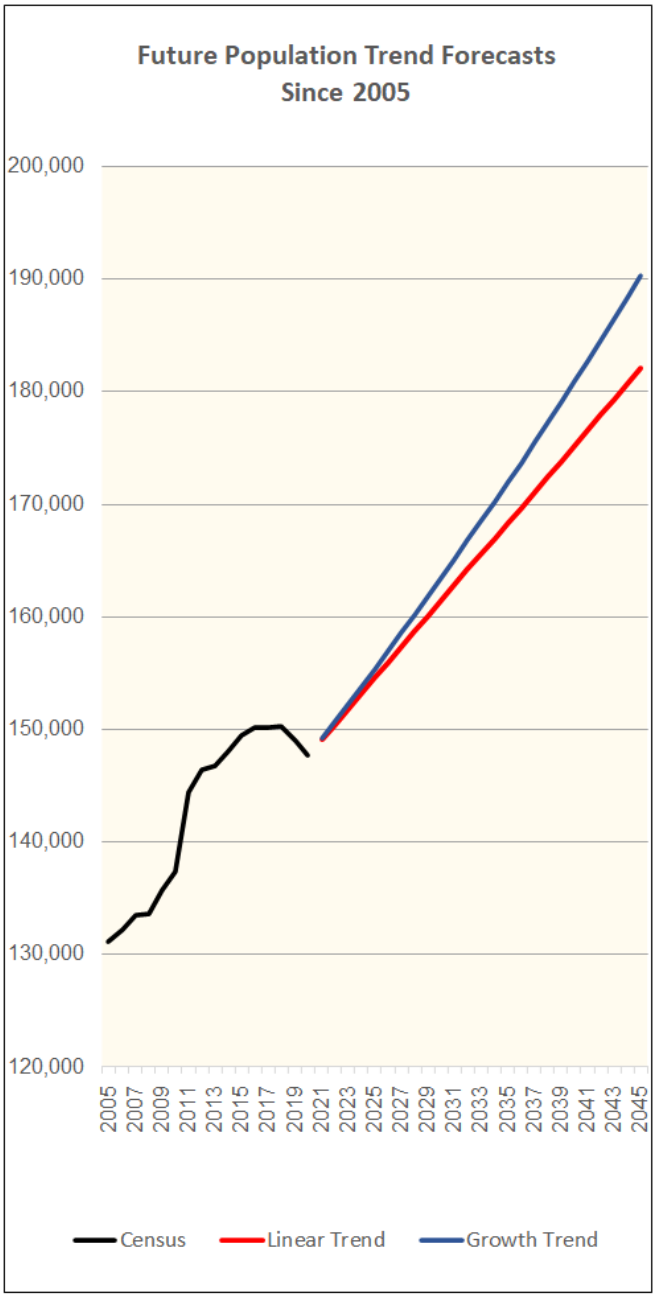
Population Forecasts

Two forecast methods were used to project the city's past population growth forward to 2045, one using a 'linear trend' (straight line) forecast algorithm and the other a 'growth trend' (curved line) forecast algorithm. Table A-3 shows the results based on the Census estimates for the city's historic growth period 2005-2018. The graph accompanying the table shows the 2005-2018 Census estimates and the results of the two projections.

The forecast algorithms 'fit' the data points to a smooth straight or curved line, including the 2005-2018 Census data points. 'Fitting' the projections to a specific curve also changes the data points for each year between 2005 and 2018. The projections, therefore, must be 'rectified' to the actual Census data for those years to produce the final projections.

Table A-3: Population Forecasts Reflecting Past Growth Period

	Linear Trend		Growth Trend	
	Raw Data Results	Rectified to Census	Raw Data Results	Rectified to Census
2005	132,156		132,250	
2006	133,585		133,596	
2007	135,014		134,957	
2008	136,443		136,331	
2009	137,873		137,719	
2010	139,302		139,122	
2011	140,731		140,538	
2012	142,160		141,970	
2013	143,589		143,415	
2014	145,018		144,876	
2015	146,447		146,351	
2016	147,877		147,841	
2017	149,306		149,347	
2018	150,735		150,867	
2019	152,164		152,404	
2020	153,593	147,701	153,956	147,701
2021	155,022	**149,075**	155,523	**149,205**
2022	156,451	**150,450**	157,107	**150,724**
2023	157,880	**151,824**	158,707	**152,259**
2024	159,310	**153,198**	160,323	**153,810**
2025	160,739	**154,573**	161,956	**155,376**
2026	162,168	**155,947**	163,605	**156,958**
2027	163,597	**157,321**	165,271	**158,557**
2028	165,026	**158,696**	166,954	**160,171**
2029	166,455	**160,070**	168,654	**161,802**
2030	167,884	**161,444**	170,371	**163,450**
2031	169,314	**162,818**	172,106	**165,114**
2032	170,743	**164,193**	173,859	**166,796**
2033	172,172	**165,567**	175,629	**168,494**
2034	173,601	**166,941**	177,418	**170,210**
2035	175,030	**168,316**	179,225	**171,943**
2036	176,459	**169,690**	181,050	**173,694**
2037	177,888	**171,064**	182,893	**175,463**
2038	179,318	**172,439**	184,756	**177,250**
2039	180,747	**173,813**	186,637	**179,055**
2040	182,176	**175,187**	188,538	**180,878**
2041	183,605	**176,562**	190,457	**182,720**
2042	185,034	**177,936**	192,397	**184,580**
2043	186,463	**179,310**	194,356	**186,460**
2044	187,892	**180,685**	196,335	**188,359**
2045	189,322	**182,059**	198,335	**190,277**



The raw numbers of each projection method are shown in the left column for each forecast method (linear and growth). The two projections, as rectified to the actual Census figures for 2005-2020, are shown in the right-hand column under each forecast method.

The graph next to Table A-3 compares the two projections, each of which assume that the past trend will be continued into the future.

A closer examination of the line describing the 2005-2020 Census estimates suggests that the city's population growth has proceeded more along a straight line than an ever-increasing rate of

expansion. It is therefore determined that the 'linear trend' algorithm more realistically describes future population growth as a continuation of the trend established by the past Census population estimates.

Housing Unit Forecasts

Projecting new growth and development in terms of housing units is important because residential impact fees are assessed when building permits are issued for new units. Thus, the housing unit is used as the basis for assessing impact fees rather than the number of residents that may occupy the housing unit. Since the number of people residing in a particular housing unit will most likely vary — both at the time of initial occupancy and in the years ahead as resident's lifestyles and family characteristics change, families grow, children grow up, occupants age, or the unit becomes occupied by a different household as the previous occupants move out— using average occupancies based on the size of the unit as the basis will vary widely as the years go by. In addition, for instance, many services by the Fire Department are not related to the size of one's house—kitchen fires occur in all sizes of houses with the same frequency, as well as medical emergencies. Basing impact fees on the number of residents living in a dwelling would result in a constant reassessment of the impact fees due because the demand for services would vary as the number of residents in the unit varies. Instead, using an average fee per housing unit based on average household sizes results in 'averaging' the demand for services which would otherwise vary as the population in the unit changes over the coming 20 years.

The future increase in the number of housing units in the city is based on the population forecasts for the linear trend algorithm presented in the previous section. The table on the next page shows how the housing projections were calculated. The approach is to determine the number of households each year (which equates to the number of occupied housing units) and then to expand that to the total number of housing units by adding in vacant units. As noted above regarding the population forecasts, the housing unit forms the basis for many of the impact fee calculations. The type of occupancy is not relevant, whether the housing unit is one's personal home, used by the owner seasonally, or available as a vacation rental or Air B&B, the demand for such City services as public safety remain essentially the same.

Household Projections

First, future population numbers for the linear trend projection from Table A-3 are converted into the number of households expected in future years. The results are shown on Table A-4, on the next page.

The left-hand section of the table shows the Woods & Poole[3] forecasts for population and households for the entire county. These figures are used only to allow a calculation of the average number of people per household countywide, and to reveal how W&P projects those averages to change in the future. Given the tightly knit sociometric model that W&P uses, the relationship between population and households relative to average ratios between them is considered viable as guides to such ratios for Savannah.

[3] Woods & Poole Economics is a nationally recognized source of annual economic and demographic projections for the country as a whole, individual states, regions and counties. See Appendix B for a description of their model categories and projection techniques.

Table A-4 shows the average population per household, countywide, based on the total population and the total number of households projected by Woods & Poole. The 'average population per household' figures are gross totals, absorbing persons living in group quarters, etc. Setting the 2020 average population per household at 100%, the percentage of the average population per household in each subsequent year is calculated. In 2021, for instance, the average is 99.59% of the figure in 2020, while by 2045, the average is 100.27% of the 2020 figure.

Table A-4: Housing Unit Forecasts: 2022-2045

	Chatham County (Woods & Poole)					Savannah			
	Population	House-holds	Avg Pop per HH*	Percent of 2020		Population	Avg Pop per HH	House-holds	Housing Units
2020	291,127	114,037	2.552917	100.0000%	2020	147,701	2.505573	58,949	68,089
2021	293,443	115,414	2.542525	99.5929%	2021	149,075	2.495373	59,741	69,004
2022	295,802	116,657	2.535656	99.3239%	2022	150,450	2.488632	60,455	69,829
2023	298,104	117,818	2.530208	99.1105%	2023	151,824	2.483284	61,138	70,617
2024	300,399	118,916	2.526145	98.9513%	2024	153,198	2.479297	61,791	71,372
2025	302,680	119,957	2.523237	98.8374%	2025	154,573	2.476443	62,417	72,095
2026	304,940	120,949	2.521228	98.7587%	2026	155,947	2.474471	63,022	72,794
2027	307,173	121,899	2.519898	98.7066%	2027	157,321	2.473166	63,611	73,474
2028	309,375	122,805	2.519238	98.6808%	2028	158,696	2.472518	64,184	74,136
2029	311,551	123,655	2.519518	98.6917%	2029	160,070	2.472793	64,732	74,769
2030	313,702	124,456	2.520586	98.7335%	2030	161,444	2.473841	65,260	75,379
2031	315,825	125,220	2.522161	98.7953%	2031	162,818	2.475387	65,775	75,973
2032	317,914	125,938	2.524369	98.8818%	2032	164,193	2.477554	66,272	76,547
2033	319,971	126,620	2.527018	98.9855%	2033	165,567	2.480154	66,757	77,108
2034	321,988	127,271	2.529940	99.1000%	2034	166,941	2.483022	67,233	77,657
2035	323,961	127,889	2.533142	99.2254%	2035	168,316	2.486164	67,701	78,198
2036	325,884	128,485	2.536358	99.3514%	2036	169,690	2.489321	68,167	78,736
2037	327,757	129,060	2.539571	99.4772%	2037	171,064	2.492474	68,632	79,273
2038	329,593	129,610	2.542960	99.6100%	2038	172,439	2.495800	69,092	79,805
2039	331,393	130,137	2.546493	99.7484%	2039	173,813	2.499268	69,546	80,329
2040	333,168	130,657	2.549944	99.8835%	2040	175,187	2.502654	70,000	80,853
2041	334,923	131,194	2.552884	99.9987%	2041	176,562	2.505540	70,469	81,395
2042	336,663	131,760	2.555123	100.0864%	2042	177,936	2.507738	70,955	81,957
2043	338,394	132,347	2.556869	100.1548%	2043	179,310	2.509452	71,454	82,533
2044	340,122	132,948	2.558309	100.2112%	2044	180,685	2.510864	71,961	83,119
2045	341,855	133,547	2.559810	100.2700%	2045	182,059	2.512338	72,466	83,702
					2022-2045	**31,609**		**12,011**	**13,873**

* Gross - Total households ÷ total population.

Source: Woods & Poole Economics, Inc., 2021 Georgia Data Book, Chatham County.

Vacancy rate based on 2020 Census data = 13.4%

Source: 2020-2045 City Population based on 2005-2018 Linear Trend forecast.

The assumption is that the average population-per-household sizes in Savannah will 'track' proportionally the trend projected by Woods & Poole countywide. For 2020, Woods & Poole figures show the average gross population per household in Chatham County to be a little more than 2.55. Woods & Poole population and household figures for each subsequent year also produce the average annual

gross population per household out to 2045. These countywide annual average population per household figures are then shown as percentages of the 2020 average figure to show the extent to which these ratios vary over time.

Dividing the 2020 population figure for Savannah of 147,701 people (from Table A-3) and the 58,949 households reported by the Census, yields an average gross population of slightly less than 2.51 people per household. For household population figures in the city in subsequent years, the 2020 average per household is varied in concert with the percentage changes countywide. For instance, the 2021 countywide average is 99.5929% of the 2020 figure. This percentage, multiplied times the city's 2020 figure yields an average population per household of 2.495373. By dividing the projected population in the city each year (from Table A-3) by the average population per household each year, the number of households is calculated.

Housing Units

Finally, the number of housing units (i.e., the number of households plus vacant units) is calculated.

The 2020 Census reported a total of 68,089 housing units in the city, of which 58,949 were occupied and 9,140 were vacant. Thus, the vacancy rate indicated by the Census figures was 13.4% of the total number of housing units. In order to convert the number of households into the number of housing units, however, each household total must be multiplied by 1.155049 (which is derived by dividing 68,089 housing units in 2020 by 58,949 households).

Over the forecast period, a net total of almost 13,900 new housing units are projected to be added to the city, an almost 20% increase over 2022 producing almost 17% of the total housing stock in 2045.

It is worth noting that more than the 13,900 units will most likely be constructed. However, replacing a housing unit with a new housing unit is not impact fee eligible because there is no net increase in the demand for public services. Thus, the net total increase will produce increased demands for public services and will therefore be eligible for impact fee assessments.

Employment Forecasts

For the employment projections, we looked first to the forecasts prepared by Woods & Poole Economics for Chatham County.

Woods & Poole Economics has proven to be a valuable resource for employment data at the county level, both in terms of the wide range of types of jobs and its long-range annual projections. Importantly, while the Census Bureau counts the number of employed people, Woods & Poole counts jobs, which captures people holding two or more jobs, self-employed sole proprietors and part-time workers, and vacant jobs available. This gives a more complete picture than Census figures as to the employment vitality and economic base of a community.

Table A-5 on the next page shows the forecasts for employment countywide in Chatham County for several benchmark years as well as the projected increase (or decrease) in the projected number of jobs between 2022 and 2045. The employment figures for the county are based on forecasts published by Woods & Poole Economics in their latest (2021) *Georgia Profile* for Chatham County.

Various individual employment categories are grouped together in Table A-5 to better understand broad types of employment in the county and to facilitate identification of those types of businesses that would come under an impact fee program.

- The first grouping is referred to as 'non-building' related jobs. These types of jobs are those that do not normally require issuance of a building permit, and thus would not be assessed an impact fee. Such jobs include any employment that is considered to be transitory in nature, such as those working on construction sites, or are strictly land-based such as farming and other agricultural workers.
- The table also shows the number of workers employed by governmental entities (county, state and federal) as estimated by Woods & Poole for each year. Governments are exempt from impact fees, whether a building is to be constructed or not.
- The last grouping on the table shows what is called 'value-added' employment. This category encompasses private sector jobs, including nonprofits and institutions. Businesses employing these 'private sector' workers are the ones that would be most likely to be assessed an impact fee.

As can be seen on the table, notable changes are forecast for the non-building types of employment between 2022 and 2045. Construction jobs comprise the vast majority of all 'non-building' types of jobs (over 96%) and will drop the least overall by 2045.

Government jobs are expected to increase by only 5% overall, with gains at the state and local level tempered by a reduction in federal civilian jobs.

The greatest employment growth by 2045 is projected in the 'value-added' grouping—an increase of an additional 25.5% over the total number of such jobs today. The jobs in this category are grouped under two sub-categories: 'industrial' types of companies (most notable including manufacturing and transportation & warehousing), and 'commercial and services' types of companies.

Overall, jobs in the 'value-added' category will gain in prominence countywide and are projected to increase from 84.6% of all jobs in the county today to 87.7% of all jobs by 2045. Those 'value added' employment categories are projected to add almost 55,000 net new jobs to the county's employment base.

Table A-5: County-wide Employment Forecast (Jobs)

	2022	2025	2030	2035	2040	2045	2022-2045 Change	
							Number	Percent
Total Employment	**222,407**	**231,362**	**246,148**	**260,537**	**274,487**	**288,034**	**65,627**	**22.8%**
Farm Employment	54	52	50	48	46	44	-10	-22.7%
Forestry, Fishing	232	230	225	221	216	211	-21	-10.0%
Mining	86	81	73	65	57	50	-36	-72.0%
Construction	9,232	9,221	9,195	9,158	9,114	9,064	-168	-1.9%
Total Non-Building	**9,604**	**9,584**	**9,543**	**9,492**	**9,433**	**9,369**	**-235**	**-2.5%**
Federal Civilian	2,640	2,605	2,548	2,493	2,439	2,384	-256	-10.7%
Federal Military	5,234	5,238	5,246	5,254	5,262	5,270	36	0.7%
State & Local Government	16,760	17,001	17,374	17,710	18,014	18,285	1,525	8.3%
Total Government	**24,634**	**24,844**	**25,168**	**25,457**	**25,715**	**25,939**	**1,305**	**5.0%**
Utilities	401	387	363	337	311	285	-116	-40.7%
Manufacturing	16,899	16,965	17,009	16,990	16,897	16,720	-179	-1.1%
Wholesale Trade	6,547	6,573	6,600	6,581	6,499	6,358	-189	-3.0%
Transportation & Warehousing	18,919	20,213	22,390	24,592	26,815	29,059	10,140	34.9%
Subtotal: Industrial	***42,766***	***44,138***	***46,362***	***48,500***	***50,522***	***52,422***	***9,656***	***18.4%***
Retail Trade	22,320	22,602	23,050	23,425	23,693	23,861	1,541	6.5%
Information	2,647	2,640	2,628	2,616	2,602	2,587	-60	-2.3%
Finance & Insurance	7,096	7,397	7,727	7,866	7,851	7,724	628	8.1%
Real Estate	10,285	11,028	12,352	13,680	15,020	16,374	6,089	37.2%
Professional & Technical Services	10,068	10,776	11,928	13,052	14,159	15,256	5,188	34.0%
Management of Companies	982	935	855	773	691	613	-369	-60.2%
Administrative & Waste Services	19,062	20,525	23,083	25,814	28,744	31,902	12,840	40.2%
Educational Services	5,770	6,258	7,063	7,865	8,673	9,496	3,726	39.2%
Health Care & Social Assistance	23,781	24,921	26,846	28,667	30,289	31,635	7,854	24.8%
Arts, Entertainment & Recreation	5,047	5,465	6,192	6,960	7,774	8,638	3,591	41.6%
Accommodation & Food Services	25,560	27,086	29,609	32,118	34,629	37,157	11,597	31.2%
Other Private Services	12,785	13,163	13,742	14,252	14,692	15,061	2,276	15.1%
Subtotal: Commercial & Services	***145,403***	***152,796***	***165,075***	***177,088***	***188,817***	***200,304***	***54,901***	***27.4%***
Total Value-Added	**188,169**	**196,934**	**211,437**	**225,588**	**239,339**	**252,726**	**64,557**	**25.5%**

Source: Woods & Poole Economics, Inc., 2021 Georgia Data Book, Chatham County.

In order to isolate jobs data for Savannah itself, we turn first to the latest commuting data available, which was published as part of the 2010 Census. Table A-6 shows where in the region the vast majority (98%) of people working in Chatham County actually lived, with the final 2% (about 3,000 commuters) coming from much farther away.

The Census also reported the total number of people working in Savannah, comprising both residents of the city and commuters living outside of the city. While the data for the city did not include places

of origin, we know the total number of people working in the city. Using a rule-of-thumb correlation between the total workers in the city (102,266) compared to the total number of people working in Chatham County (145,888), it can be deduced that Savannah workers represented a bit over 70% of all of the workers in the county.

Table A-6: Commuting Patterns

Number of Commuters Working in Chatham County	Percent of all County Workers	Residence of Chatham County Workers
108,826	74.61%	Chatham County
13,142	9.01%	Effingham County
7,171	4.92%	Bryan County
4,113	2.82%	Liberty County
3,620	2.48%	Bulloch County
3,368	2.31%	South Carolina
1,608	1.10%	Beaufort County
1,040	0.71%	Jasper County
142,888	97.96%	Total from Region
145,867	100.00%	Total from All Counties

Total Workers in Savannah	102,266	Includes City Residents and Commuters
Percent of Chatham County	70.1091%	

Sources: Commuter-Adjusted Daytime Population for Cities and Counties, and Daytime Residence County to Chatham County Flows by Workplace, Bureau of the Census, 2010.

That percentage (70.1091%) is then applied to the 'value-added' jobs data on Table A-5 to estimate the number of jobs in Savannah in each 'value-added' category. The results are shown on Table A-7, which details an overall increase of 25.5%: an additional 45,262 jobs moving from a total of almost 132,000 jobs in 2022 to well over 177,000 by 2045.

Table A-7: Savannah Value-Added Employment Forecast (Jobs)

	2022	2025	2030	2035	2040	2045	2022-2045 Change	
							Number	Percent
Utilities	281	271	254	236	218	200	-81	-40.5%
Manufacturing	11,848	11,894	11,925	11,912	11,846	11,722	-126	-1.1%
Wholesale Trade	4,590	4,608	4,627	4,614	4,556	4,458	-132	-3.0%
Transportation & Warehousing	13,264	14,171	15,697	17,241	18,800	20,373	7,109	34.9%
Subtotal: Industrial	29,983	30,944	32,503	34,003	35,420	36,753	6,770	18.4%
Retail Trade	15,648	15,846	16,160	16,423	16,611	16,729	1,081	6.5%
Information	1,856	1,851	1,842	1,834	1,824	1,814	-42	-2.3%
Finance & Insurance	4,975	5,186	5,417	5,515	5,504	5,415	440	8.1%
Real Estate	7,211	7,732	8,660	9,591	10,530	11,480	4,269	37.2%
Professional & Technical Services	7,059	7,555	8,363	9,151	9,927	10,696	3,637	34.0%
Management of Companies	688	656	599	542	484	430	-258	-60.0%
Administrative & Waste Services	13,364	14,390	16,183	18,098	20,152	22,366	9,002	40.2%
Educational Services	4,045	4,387	4,952	5,514	6,081	6,658	2,613	39.2%
Health Care & Social Assistance	16,673	17,472	18,821	20,098	21,235	22,179	5,506	24.8%
Arts, Entertainment & Recreation	3,538	3,831	4,341	4,880	5,450	6,056	2,518	41.6%
Accommodation & Food Services	17,920	18,990	20,759	22,518	24,278	26,050	8,130	31.2%
Other Private Services	8,963	9,228	9,634	9,992	10,300	10,559	1,596	15.1%
Subtotal: Commercial & Services	101,940	107,124	115,731	124,156	132,376	140,432	38,492	27.4%
Total Value-Added	131,923	138,068	148,234	158,159	167,796	177,185	45,262	25.5%

Ratio of Savannah workers to County workers. 70.1091%

Table A-8 provides a more detailed look at the city's job projections from Table A-7, for every 'value-added' employment category for every year from 2022 to 2045. (The 'Industrial' and the 'Commercial' groupings are used in calculations regarding vehicle trip projections related to road improvements.)

Of the additional 45,262 jobs generated by 2045, two-thirds of all new jobs are projected to be created in only four business categories: Administrative jobs (20% of the total), followed closely by Accommodation & Food Services (18%) and Transportation & Warehousing (16%), and finally Health Care and Social Assistance (12%).

Table A-8: Savannah Value-Added Employment by Year

	INDUSTRIAL				COMMERCIAL												TOTAL
	Utilities	Manufac-turing	Wholesale Trade	Ware-housing	Retail Trade	Infor-mation	Finance & Insurance	Real Estate	Technical Services	Manage -ment	Admin Services	Education Services	Health & Social	Rec, Enter-tainment	Lodging & Food Svcs	Other Services	
2022	281	11,848	4,590	13,264	15,648	1,856	4,975	7,211	7,059	688	13,364	4,045	16,673	3,538	17,920	8,963	**131,923**
2023	278	11,858	4,595	13,568	15,712	1,854	5,030	7,392	7,222	677	13,716	4,158	16,942	3,638	18,275	9,047	**133,962**
2024	274	11,867	4,599	13,872	15,776	1,853	5,086	7,573	7,385	666	14,069	4,272	17,210	3,739	18,630	9,131	**136,002**
2025	271	11,877	4,604	14,176	15,840	1,851	5,141	7,754	7,548	655	14,421	4,385	17,479	3,839	18,985	9,215	**138,041**
2026	268	11,887	4,609	14,481	15,904	1,849	5,196	7,936	7,711	644	14,774	4,499	17,747	3,940	19,340	9,299	**140,084**
2027	264	11,896	4,613	14,785	15,968	1,847	5,251	8,117	7,874	632	15,126	4,612	18,016	4,040	19,694	9,382	**142,117**
2028	261	11,906	4,618	15,089	16,032	1,846	5,307	8,298	8,037	621	15,478	4,725	18,284	4,140	20,049	9,466	**144,157**
2029	257	11,915	4,622	15,393	16,096	1,844	5,362	8,479	8,200	610	15,831	4,839	18,553	4,241	20,404	9,550	**146,196**
2030	254	11,925	4,627	15,697	16,160	1,842	5,417	8,660	8,363	599	16,183	4,952	18,821	4,341	20,759	9,634	**148,234**
2031	250	11,917	4,620	16,007	16,205	1,840	5,426	8,847	8,519	588	16,580	5,065	19,062	4,452	21,111	9,701	**150,190**
2032	247	11,909	4,613	16,318	16,250	1,838	5,434	9,034	8,676	576	16,977	5,178	19,304	4,563	21,463	9,767	**152,147**
2033	243	11,901	4,606	16,628	16,295	1,837	5,443	9,221	8,832	565	17,374	5,291	19,545	4,674	21,815	9,834	**154,104**
2034	240	11,893	4,599	16,938	16,340	1,835	5,452	9,408	8,989	553	17,771	5,404	19,787	4,785	22,167	9,900	**156,061**
2035	236	11,886	4,592	17,249	16,386	1,833	5,461	9,595	9,145	542	18,168	5,517	20,028	4,896	22,519	9,967	**158,020**
2036	232	11,878	4,584	17,559	16,431	1,831	5,469	9,782	9,301	530	18,564	5,629	20,269	5,006	22,870	10,034	**159,969**
2037	229	11,870	4,577	17,869	16,476	1,829	5,478	9,969	9,458	519	18,961	5,742	20,511	5,117	23,222	10,100	**161,927**
2038	225	11,862	4,570	18,179	16,521	1,828	5,487	10,156	9,614	507	19,358	5,855	20,752	5,228	23,574	10,167	**163,883**
2039	222	11,854	4,563	18,490	16,566	1,826	5,495	10,343	9,771	496	19,755	5,968	20,994	5,339	23,926	10,233	**165,841**
2040	218	11,846	4,556	18,800	16,611	1,824	5,504	10,530	9,927	484	20,152	6,081	21,235	5,450	24,278	10,300	**167,796**
2041	214	11,821	4,536	19,115	16,635	1,822	5,486	10,720	10,081	473	20,595	6,196	21,424	5,571	24,632	10,352	**169,673**
2042	211	11,796	4,517	19,429	16,658	1,820	5,468	10,910	10,235	462	21,038	6,312	21,613	5,692	24,987	10,404	**171,552**
2043	207	11,772	4,497	19,744	16,682	1,818	5,451	11,100	10,388	452	21,480	6,427	21,801	5,814	25,341	10,455	**173,429**
2044	204	11,747	4,478	20,058	16,705	1,816	5,433	11,290	10,542	441	21,923	6,543	21,990	5,935	25,696	10,507	**175,308**
2045	200	11,722	4,458	20,373	16,729	1,814	5,415	11,480	10,696	430	22,366	6,658	22,179	6,056	26,050	10,559	**177,185**
Change 2022-2045	**(81)**	**(126)**	**(132)**	**7,109**	**1,081**	**(42)**	**440**	**4,269**	**3,637**	**(258)**	**9,002**	**2,613**	**5,506**	**2,518**	**8,130**	**1,596**	**45,262**

Appendix B: Woods & Poole Methodology

Selected data from Woods & Poole for the years 2012 to 2045 have been used as critical factors in the creation of population, household and employment estimates for Savannah. The following has been excerpted from the 2021 State Profile for Georgia, prepared by Woods & Poole Economics, Inc., Washington, D.C., in explanation of the methodology W&P uses in creating their estimates and projections, definitions of employment categories, and the interconnected nature of their econometric model approach.

Introduction

The Woods & Poole Economics, Inc. database contains more than 900 economic and demographic variables for every county in the United States for every year from 1970 to 2050. This comprehensive database includes detailed population data by age, sex, and race; employment and earnings by major industry; personal income by source of income; retail sales by kind of business; and data on the number of households, their size, and their income. All of these variables are projected for each year through 2050. In total, there are over 200 million statistics in the regional database. The regional model that produces the projection component of this database was developed by Woods & Poole. The regional projection methods are revised somewhat year to year to reflect new computational techniques and new sources of regional economic and demographic information. Each year, a new projection is produced based on an updated historical database and revised assumptions.

The fact that the proprietary Woods & Poole economic and demographic projections rely on a very detailed database, makes them one of the most comprehensive county-level projections available. A description of some characteristics of the database and projection methods is contained below.

Overview of the Projection Methods

The strength of Woods & Poole's economic and demographic projections stems from the comprehensive historical county database and the integrated nature of the projection model. The projection for each county in the United States is done simultaneously so that changes in one county will affect growth or decline in other counties. For example, growth in employment and population in Houston will affect growth in other metropolitan areas, such as Cleveland. This reflects the flow of economic activity around the country as new industries emerge or relocate in growing areas and as people migrate, in part because of job opportunities. The county projections are developed within the framework of the United States projection made by Woods & Poole. The U.S. projection is the control total for the 2021 regional projections and is described in the 'Overview of the 2021 Projections' chapter included in Woods & Poole publications.

The regional projection technique used by Woods & Poole—linking the counties together to capture regional flows and constraining the results to a previously determined United States total—avoids a common pitfall in regional projections. Regional projections are sometimes made for a city or county without regard for potential growth in surrounding areas or other areas in the country. Such projections may be simple extrapolations of recent historical trends and, as a result, may be too optimistic or pessimistic. If these county projections were added together, the total might differ considerably from any conceivable national forecast scenario; this is the result of each regional projection being generated independently without interactive procedures and without being integrated into a consistent national projection.

The methods used by Woods & Poole to generate the county projections proceed in four stages. First, forecasts to 2050 of total United States personal income, earnings by industry, employment by

industry, population, inflation, and other variables are made. Second, the country is divided into 179 Economic Areas (EAs) as defined by the U.S. Department of Commerce, Bureau of Economic Analysis (BEA). The EAs are aggregates of contiguous counties that attempt to measure cohesive economic regions in the United States; in the 2021 Woods & Poole model, EA definitions released by the BEA in May 2007 are used. For each EA, a projection is made for employment, using an 'export-base' approach; in some cases, the employment projections are adjusted to reflect the results of individual EA models or exogenous information about the EA economy. The employment projection for each EA is then used to estimate earnings in each EA. The employment and earnings projections then become the principal explanatory variables used to estimate population and number of households in each EA.

The third stage is to project population by age, sex, and race for each EA on the basis of net migration rates projected from employment opportunities. For stages two and three, the U.S. projection is the control total for the EA projections. The fourth stage replicates stages two and three except that it is performed at the county level, using the EAs as the control total for the county projections.

The 'Export-Base' Approach

The specific economic projection technique used by Woods & Poole to generate the employment, earnings, and income estimates for each county in the United States generally follow a standard economic 'export-base' approach. This relatively simple approach to regional employment projections is one that has been used by a number of researchers.

Certain industrial sectors at the regional level are considered 'basic.' This means that these sectors produce output that is not consumed locally but is 'exported' out of the region for national or international consumption. This assumption allows these sectors to be linked closely to the national economy, and hence follow national trends in productivity and output growth. Normally, the 'basic' sectors are mining, agriculture, manufacturing, and the Federal government. In contrast, 'non-basic' sectors are those such as retail trade, transportation, communication, and construction, the output of which is usually consumed locally. The growth of the 'non-basic' sectors depends largely on the growth of the 'basic' sectors that form the basis of the region's economy.

Intuitively, this approach has great appeal and there are numerous examples that seem to support the 'export-base' theory. Automobile production in Detroit, for instance, is obviously much more sensitive to national and international price and demand for transportation equipment than to local demand. In Texas, oil and natural gas exploration and production are tied closely to the worldwide demand and supply of petroleum resources and not tied primarily to energy consumption in Texas.

Although the theory is appealing, some shortcomings do exist in the 'export-base' approach. For example, some 'basic' commodities produced locally are consumed locally. Producers of durable equipment used in other manufacturing processes are often affected not by the national demand for their product but by the regional demand. Machine tool makers that supply the local automobile industry in Detroit will prosper to the extent Detroit's automobile producers prosper. In Houston, the strength of the local oil industry will affect the demand and production of equipment for oil and natural gas production and exploration. In both of these instances, some durable manufacturing industries exist to serve local, not national, markets.

However, despite the shortcomings, the availability of relatively clean data for sub-national geographic areas makes the 'export-base' approach very useful. The analytical framework for projections using the 'export-base' approach entails estimating either demand equations or calculating historical growth rate differentials for output by sector. The principal explanatory variable, or the comparative data series for growth rate differentials, is the national demand for the output of that sector.

Employment-by-sector data are often used as a surrogate variable since county output-by-sector data are not available; employment-by-sector data is used by Woods & Poole. Earnings projections are then obtained by using earnings-per-employee data either estimated as part of the model or imposed exogenously on the system. The complementary relationship could also be estimated, i.e., using earnings forecast to derive employment based on earnings-per-employee data; this procedure has been used previously in some Woods & Poole regional models.

A modification of the 'export-base' approach is used by Woods & Poole to account for regional variants to normal 'basic'/'non-basic' industry definitions. Some 'non-basic' sectors can be more appropriately modeled as 'basic' sectors in certain regional economies. The finance and insurance sector or wholesale trade sector in New York City, for example, and the accommodation and food services sector in Las Vegas, are cases in which traditionally 'non-basic' sectors are really 'basic.' New York is a worldwide financial and trade center and thus 'exports' these services outside of the region; Las Vegas, as a vacation and entertainment center, similarly 'exports' the output of its accommodation and food services sector to other parts of the country. Activity in these sectors, in these specific geographic areas, is therefore linked more closely to the performance of these same sectors in the surrounding regions and the nation as a whole than to the other 'basic' industries in the region.

The Demographic Model

The demographic portion of the regional model follows a traditional cohort-component analysis based on calculated fertility and mortality in each county or EA. The 'demand' for total population is estimated from the economic model: if the demand for labor is forecast to rise for a particular county or EA, then either the labor force participation rate will rise or population in-migration will be positive. The inverse is true for counties and EAs with projected declines in employment. Therefore, future EA and county migration patterns for population by age, sex, and race are based on employment opportunities. Individuals and families are assumed to migrate, at least in part, in response o employment opportunities with two exceptions: for population aged 65 and over and for college or military-aged population, migration patterns over the forecast period are based on historical net migration and not economic conditions. The integration of economic and demographic regional analysis is a significant strength of the Woods & Poole approach.

The age, sex, and race distribution of the population is projected by aging the population by single year of age by sex and by race for each year through 2050 based on county or EA specific mortality, fertility, and migration rates estimated from historical data. In the Woods & Poole model, projected net mortality and migration are estimated based on the historical net change in population by age, race, and sex for a particular county or EA. Similarly, projected net births and migration of age zero population by race are estimated based on the historical change in age zero population by race per female population age 15 to 44 by race for a particular county or EA.

The United States population by age, sex, and race projections, 2020 to 2050, are based on Bureau of the Census population estimates for 1990 through 2019. Woods & Poole forecasts these U.S. estimates with a cohort-component model based on the year to year change in U.S. population by single year of age, race, and sex. Forecast fertility, mortality, and international migration are estimated from the Census population estimates and are applied exogenously to the Woods & Poole U.S. projections. Woods & Poole produces only a 'middle' U.S. population forecast - this forecast is similar to the Census 'middle' forecast scenario for the U.S. population. The U.S. population by age, sex, and race forecast is the control total for the EA projections. Each EA projection serves as the control totals for the county projections.

The 2021 Woods & Poole U.S. population projections, 2020 to 2050, are higher than the 2020 Woods & Poole population projections because historical fertility and net migration 2010 through 2019, based on U.S. Census post-censal estimates, are higher than previously projected resulting in higher fertility and migration assumptions over the forecast period.

Population

Population is defined as July 1 residential population and includes: civilian population; military population except personnel stationed overseas; college residents; institutional populations, such as prison inmates and residents of mental institutions, nursing homes, and hospitals; and estimates of undocumented aliens. Excluded are persons residing in Puerto Rico, U.S. territories and possessions, and U.S. citizens living abroad.

For the years 1990 to 2050 the population data are broken down by five race/ethnic groups: White not including Hispanic or Latino (i.e. Non-Hispanic), Black Non-Hispanic, Native American or American Indian Non-Hispanic, Asian American and Pacific Islanders Non-Hispanic, and Hispanic or Latino. Population by race as defined by the Census Bureau is based on self-identification by respondents. ***White population*** includes people who identify themselves as White and people who do not identify themselves by any race but identify themselves by nationality, such as Canadian, German, Italian, Arab, Lebanese, Near Eastern, or Polish. ***Black population*** includes people who identify themselves as Black and people who do not identify themselves by any race but identify themselves by nationality, such as African American, Afro-American, Black Puerto Rican, Jamaican, Nigerian, West Indian, or Haitian. ***Native American population*** includes people who identify themselves as Alaska Native or American Indian by Indian tribe or classify themselves as Canadian Indian, French American Indian, Spanish-American Indian, Eskimos, Aleuts, and Alaska Indians. ***Asian American and Pacific Islander*** American Indian and Alaska Native population includes people who identify themselves as Alaska Native or American Indian by Indian tribe or identify themselves as Canadian Indian, French American Indian, Spanish-American Indian, Eskimos, Aleuts, and Alaska Indians.

Hispanic or Latino population includes people who identify themselves as having origins in Spain, the Spanish-speaking countries of Central or South America, the Dominican Republic, and who identify themselves generally as Spanish, Spanish-American, Hispanic, Hispano, or Latino. Hispanic population is not a race group but rather a description of ethnic origin. Although Hispanics are part of the other four race groups they are shown separately in the Woods & Poole database so that the four race groups plus Hispanic equals total population.

Households

Households are defined as occupied housing units. A housing unit is a house, an apartment, a group of rooms, or a single room occupied as separate living quarters. The occupants of a housing unit may be a single family, one person living alone, two or more families living together, or any group of related or unrelated persons who share living quarters. All people are part of a household except those who reside in group quarters. Group quarters include living arrangements such as prisons, homes for the aged, rooming houses, college dormitories, and military barracks. The average size of households is defined as total population less group quarters population divided by the number of households. Mean household income is defined as total personal income less estimated income of group quarters population divided by the number of households.

Employment

The employment data in the Woods & Poole database are a complete measure of the number of full- and part-time jobs by place of work. Historical data, 1969-2017, are from the U.S. Department of

Commerce, Bureau of Economic Analysis. Because part-time workers are included, a person holding two part-time jobs would be counted twice.

Data on proprietors include farm and non-farm proprietors by sector. Proprietors include not only those people who devote the majority of their time to their proprietorship, but people who devote any time at all to a proprietorship. Thus, a person who has a full-time wage and salary job and on nights and weekends runs a small business legally defined as a proprietorship would be counted twice. The employment data therefore include full- and part-time proprietors.

Private household employment data include persons employed by a household on the premises, such as full-time baby-sitters, housekeepers, gardeners, and butlers. Miscellaneous employment data include judges and all elected officials, persons working only on commission in sectors such as real estate and insurance, students employed by the colleges or universities in which they are enrolled, and unincorporated subcontractors in sectors such as construction.

The employment data used by Woods & Poole comprise the most complete definition of the number of jobs by county. Woods & Poole data may be higher than that from other sources because they measure more kinds of employment.

Employment by Sector

The employment data is by two-digit North American Industry Classification System (NAICS) industry. The two-digit industries are defined in the 2002 North American Industry Classification System Manual. The employment data in the Woods & Poole 2021 database are no longer based on the Standard Industrial Classification (SIC) system definitions. For the years 1969-2000 BEA provided employment industry data by SIC rather than by NAICS; Woods & Poole has estimated the NAICS industry data for 1969-2000 from the BEA SIC 1969-2000 employment industry data and the NAICS employment industry data for the years 2001-2019.

As a rule, employment is classified in a given industry depending on the primary activity of the establishment. For example, employees of a large oil company are classified in many different sectors depending on the specific establishment in which they worked, even though the company as a whole would be considered a mining company: employees at a refinery are in manufacturing; employees at the company headquarters are in services; pipeline operators are in transportation; and oil field workers are in mining. If a given establishment is engaged in activities in different sectors, all employees are classified according to the primary activity of the establishment regardless of their actual occupations; thus, a secretary for a trucking company is a transportation worker and an accountant at a small plumbing company is a construction worker. The main exception to this rule is the classification of government workers in the Woods & Poole database: all government employees are classified in Federal civilian, Federal military, or state and local government employment, regardless of the usual classification of the establishment in which they work. Definitions for each sector, based on NAICS industries, in the Woods & Poole database are as follows:

Farming includes establishments such as farms, orchards, greenhouses, and nurseries primarily engaged in the production of crops, plants, vines, trees (excluding forestry operations), and specialties such as Christmas trees, sod, bulbs, and flower seed. It also includes establishments such as ranches, dairies, feedlots, egg production facilities, and poultry hatcheries primarily engaged in the keeping, grazing, or feeding of cattle, hogs, sheep, goats, poultry of all kinds, and special animals such as horses, bees, pets, fish farming, and animals raised for fur.

Forestry, fishing, related activities, and other includes establishments primarily engaged in harvesting timber, and harvesting fish and other animals from their natural habitats. The sector also

includes agricultural support establishments that perform one or more activities associated with farm operation, such as soil preparation, planting, harvesting, and management, on a contract or fee basis. Excluded are establishments primarily engaged in agricultural research and establishments primarily engaged in administering programs for regulating and conserving land, mineral, wildlife, and forest use. Other consists of jobs held by U.S. residents who are employed by international organizations and by foreign embassies and consulates in the United States.

Mining includes establishments that extract naturally occurring mineral solids (e.g. coal and ores), liquid minerals (e.g. crude petroleum), and gases (e.g. natural gas.) Mining includes quarrying, well operations, beneficiating (e.g., crushing, screening, washing, and flotation), and other preparation customarily per-formed at the mine site, or as a part of mining activity.

Utilities includes establishments engaged in the provision of electric power, natural gas, steam supply, water supply, and sewage removal. Utilities include electric power generation, electric power transmission, electric power distribution, natural gas distribution, steam supply provision, steam supply distribution, water treatment, water distribution, sewage collection, sewage treatment, and disposal of waste through sewer systems and sewage treatment facilities. Excluded from this sector are establishments primarily engaged in waste management services that collect, treat, and dispose of waste materials but do not use sewer systems or sewage treatment facilities. Also excluded from this sector are federal or state or local government operated establishments.

Construction includes establishments primarily engaged in building new structures and roads, alterations, additions, reconstruction, installations, and repairs. It includes general contractors engaged in building residential and nonresidential structures; contractors engaged in heavy construction, such as abridges, roads, tunnels, and pipelines; and special trade contracting, such as plumbing, electrical work, masonry, and carpentry. Construction includes establishments primarily engaged in the preparation of sites for new construction, including demolition, and establishments primarily engaged in subdividing land for sale as building sites. Construction work done may include new work, additions, alterations, or maintenance and repairs.

Manufacturing includes establishments engaged in the mechanical, physical, or chemical transformation of materials, substances, or components into new products. The assembling of component parts of manufactured products is considered manufacturing, except in cases where the component parts are associated with structures. Manufacturing establishments can be plants, factories, or mills as well as bakeries, candy stores, and custom tailors. Manufacturing establishments may either process materials or may contract with other establishments to process their materials for them. Broadly defined, manufacturing industries include the following: food processing, such as canning, baking, meat processing, and beverages; tobacco products; textile mill products, such as fabric, carpets and rugs; apparel; wood products, including logging, sawmills, prefabricated homes, and mobile homes; furniture; paper; printing; chemicals, such as plastics, paints, and drugs; petroleum refining; rubber and plastics; leather products; stone, clay, and glass; primary metals, such as steel, copper, aluminum, and including finished products such as wire, beams, and pipe; fabricated metals, such as cans, sheet metal, cutlery, and ordnance; industrial machinery, including computers, office equipment, and engines; electronics and electrical equipment; transportation equipment, such as cars, trucks, ships, and airplanes; instruments; and miscellaneous industries, such as jewelry, musical instruments, and toys. Excluded from manufacturing is publishing of printed materials.

Wholesale trade includes establishments engaged in wholesaling merchandise, generally without trans-formation, and rendering services incidental to the sale of merchandise. The merchandise described in this sector includes the outputs of agriculture, mining, manufacturing, and certain information industries, such as publishing. Wholesale establishments are primarily engaged in selling

merchandise to retailers; or to industrial, commercial, institutional, farm, construction contractors; or to professional business users; or to other wholesalers or brokers. The merchandise sold by wholesalers includes all goods used by institutions, such as schools and hospitals, as well as virtually all goods sold at the retail level. Wholesalers can be merchant wholesalers who purchase goods from manufacturers or other wholesalers and sell them; sales branches of manufacturing, mining, or farm companies engaged in marketing the products of the company to retail establishments; or agents, merchandise or commodity brokers, and commission merchants.

Retail trade includes establishments engaged in retailing merchandise, generally without transformation, and rendering services incidental to the sale of merchandise. Retail trade includes store retailers such as motor vehicle and parts dealers including automobile, motorcycle and boat dealers as well as tire and automobile parts stores; furniture and home furnishing stores; electronics and appliance stores; food and beverage stores, including supermarkets, convenience stores, butchers, and bakeries; health and personal care stores such as pharmacies and optical goods stores; gasoline stations; clothing and clothing accessory stores; sporting goods, hobby, book and music stores; department stores; and miscellaneous establishments, including office supply stores, mobile home dealers, thrift shops, florists, tobacco stores, and pet shops. Retail trade also includes nonstore retailers such as internet and catalog sellers, as well as home delivery establishments such as heating oil dealers. Retail trade excludes eating and drinking places, including restaurants, bars, and take-out stands.

Transportation and warehousing includes industries providing transportation of passengers and cargo and warehousing and storage for goods. Establishments in these industries use transportation equipment or transportation related facilities as a productive asset. Transportation includes railroads, highway passenger transportation, trucking, shipping, air transportation, pipelines, and transportation services. Transportation also includes private postal services, and courier services but excludes the U.S. Postal Service. Warehousing includes refrigerated storage and grain elevators.

Information includes establishments engaged in producing and distributing information and cultural products; providing the means to transmit or distribute these products as well as data or communications; and processing data. The main components of this sector are the publishing industries, including software publishing, and both traditional publishing and publishing exclusively on the Internet; the motion picture and sound recording industries; movie theaters; the broadcasting industries, including traditional broadcasting and those broadcasting exclusively over the Internet; the telecommunications industries; the industries known as internet service providers and web search portals; data processing industries; and the information services industries.

Finance and insurance includes establishments primarily either engaged in or facilitating financial transactions (e.g. transactions involving the creation, liquidation, or change in ownership of financial assets.) Establishments include depository institutions, such as commercial banks, credit unions savings and loans, and foreign banks; credit institutions; credit card processing; investment companies; brokers and dealers in securities and commodity contracts; security and commodity exchanges; carriers of all types of insurance; insurance agents and insurance brokers. Also included are central banks and monetary authorities charged with monetary control.

Real estate and rental and leasing includes establishments primarily engaged in renting, leasing, or otherwise allowing the use of tangible or intangible assets, and establishments providing related services. Real estate includes real estate leasing establishments, real estate agencies and brokerages, property management establishments, appraisals establishments, and escrow agencies. Rental and leasing includes car and truck rental, consumer goods rentals such as video stores and formal wear rental stores, and commercial equipment renting and leasing construction, transportation, office

and farm equipment. Also included are establishments that lease nonfinancial and noncopyrighted intangible assets such are patents and trademarks.

Professional and technical services includes establishments that specialize in performing professional, scientific, and technical activities for others. These activities include legal advice and representation; accounting, bookkeeping, and payroll services; architectural, engineering, and specialized design services; computer services; consulting services; research services; advertising services; photographic services; translation and interpretation services; veterinary services; and other professional, scientific, and technical services. Excluded are establishments primarily engaged in providing office administrative services, such as financial planning, billing and recordkeeping, personnel, and physical distribution and logistics.

Management of companies and enterprises includes bank holding establishments, other holding establishments, corporate management establishments as well as regional and subsidiary management establishments. Company or enterprise headquarters are included.

Administrative and waste management includes establishments engaged in office administration, hiring and placing of personnel, document preparation and similar clerical services, solicitation, collection, security and surveillance services, cleaning, and waste disposal services. Among many other establishments administrative includes call centers, tele-marketers, janitorial services, armored cars, temporary employment agencies, locksmiths, landscaping, and travel agencies. Waste management includes, among other establishments, solid waste collections and disposal, landfill operations and septic tank maintenance. Excluded from administrative and waste management are establishments involved in administering, overseeing, and managing other establishments of the company or enterprise. Also excluded are government establishments engaged in administering, overseeing, and managing governmental programs.

Educational services include private elementary schools, junior colleges, colleges, universities, and professional schools. Also included are trade and vocational schools, business and secretarial schools, computer training services, language schools, fine arts training, sports training establishments, driving schools, flight schools and establishments that provide test preparation and tutoring. Educational services may be provided in part in educational institutions, the workplace, or the home through correspondence, television, or other means. Public schools, including colleges and universities, are excluded from educational services.

Health care and social assistance includes establishments providing health care and social assistance for individuals. Health care establishments include ambulatory care services (e.g., physician offices, dentists, specialists, HMOs, dialysis centers, blood banks, ambulance services), hospitals, and nursing and residential care facilities. Social assistance establishments include individual and family services (e.g., adoption agencies and youth centers) and community services such as food banks and homeless shelters. Excluded from this sector are aerobic classes and nonmedical diet and weight reducing centers. Also excluded are public hospitals and clinics.

Arts, entertainment, and recreation includes establishments that are involved in producing, promoting, or participating in live performances, events, or exhibits intended for public viewing; establishments that preserve and exhibit objects and sites of historical, cultural, or educational interest; and establishments that operate facilities or provide services that enable patrons to participate in recreational activities or pursue amusement, hobby, and leisure time interests. The sector includes establishments engaged in the performing arts, sporting events, museums, zoos, amusement and theme parks, golf courses, marinas, casinos, and gambling establishments. Excluded are movie theaters.

Accommodation and food services includes hotels, motels, casino hotels, bed and breakfasts, campgrounds and recreational vehicle parks and other lodging places as well as eating and drinking places, including restaurants, bars, and take-out stands. Also included are caterers and food service contractors.

Other services, except public administration includes churches and establishments engaged in equipment and machinery repairing, promoting or administering religious activities, grantmaking, advocacy, and establishments providing dry-cleaning and laundry services, personal care services, death care services, pet care services, photofinishing services, temporary parking services, and dating services. Private households that engage in employing workers on or about the premises in activities primarily concerned with the operation of the household are included in this sector.

Federal civilian includes all Federal government workers regardless of their establishment classification. Federal civilian employment includes executive offices and legislative bodies; courts; public order and safety; correctional institutions; taxation; administration and delivery of human resource programs, such as health, education, and public assistance services; housing and urban development programs; environmental programs; regulators, including air traffic controllers and public service commissions; the U.S. Postal Service; and other Federal government agencies.

Federal military includes Air Force, Army, Coast Guard, Marine Corps, Merchant Marine, National Guard, and Navy. Personnel deployed abroad are counted in their home base or port. Reserves who receive regular training are included. Civilians working on a military base are classified in the sector appropriate to their occupation.

State and local government is defined the same as Federal civilian except that the activities are run by state and local governments. At the local level, this includes all public schools as well as police and fire departments; at the state level, it includes all public junior colleges, colleges, and universities.

The Accuracy of the Projections

Unlike other sciences, economics and demographics cannot rely on experimentation to test theories and verify hypotheses. Rather, historical data are analyzed and theories are developed that explain the historical data. The resulting models are then used to make a projection. Woods & Poole projections, like all economic and demographic projections, utilize this approach: analyzing historical data to make estimates of future data. There are, of course, inherent limitations to projections, and the Woods & Poole projections should never be interpreted as an infallible prediction of the future; future data may differ significantly from Woods & Poole projections and Woods & Poole does not guarantee the accuracy of the projections. In all Woods & Poole publications, the word 'forecast' is used as a synonym for 'projection' and refers to Woods & Poole estimated data for any year from 2020 to 2050; in Woods & Poole publications 'projections,' or 'forecasts,' both mean estimates of future data (2020 to 2050).

One key limitation to all projections, and Woods & Poole projections in particular, is that the future is never known with any certainty. The model on which the projections are based may not accurately reflect future events. In addition, there is always the possibility of an unanticipated shock to the economy, or of some other event that was not foreseen based on an analysis of historical data. For instance, a local government may enact a new industrial policy that has an unexpected, beneficial effect on employment growth. Or an abrupt economic change, although anticipated, may occur with much greater intensity or in a shorter time period than expected. For example, the projection may assume an increase in the price of a commodity, such as oil, over a five-year period, but an embargo may raise the price to that level in only one year. In addition, the projections may not be accurate

because historical data is revised; or because the projection model does not accurately reflect demographic or economic phenomena; or because the projections contain errors; or because the smooth growth path of the long-term projections inaccurately reflects important variance in economic or demographic growth for particular regions; or because assumptions about national or regional growth, upon which the projections are based, turn out to be incorrect. There are many other types of economic and demographic events that could create outcomes far different from Woods & Poole's projections.

Another limitation results from doing forecasts for small geographic areas for small data series. Statistically, models are more reliable the larger the area and/or the series being studied. For example, a small area forecast for White men age 84 in the county would be subject to greater error because of the small sample size. This error can be reduced, although never eliminated, by constraining the small area forecasts to the forecast totals for a larger area or series; this is the method used by Woods & Poole.

Appendix C: Traffic Demand

In order to calculate new growth and development's fair share of the cost of road improvements, it is necessary to establish how much of the future traffic on Savannah's roads will be generated by new growth, over and above the traffic generated by the city's residents and businesses today. This Appendix describes the process through which this determination is made.

Summary

A Level of Service must be established for road improvements in order to assure that, ultimately, existing development and new growth are served equally. This Appendix also presents the process through which new growth and development's 'fair share' of road improvement costs is calculated, and tables summarizing the technical portions of this methodology are included.

Level of Service

For impact fee purposes, the City has set its Level of Service for road improvements at LOS "D", a level below which some roads in the city operate. Using this LOS maximizes roadway capacity before traffic conditions actually break down (LOS "F").

All road improvement projects benefit existing and future traffic proportionally to the extent that relief from over-capacity conditions eases traffic problems for everyone. For example, since new growth by 2045 will represent a certain portion of all 2045 traffic, new growth would be responsible for that portions' cost of the road improvements.

It is noted that the cost-impact of non-Savannah generated traffic on the roads traversing the city ('through' traffic) is off-set by state and federal assistance. The net cost of the road projects that accrues to Savannah reasonably represents (i.e., is 'roughly proportional' to) the impact on the roads by Savannah residents driving to and from their homes, commuters that come in to work in the city, and those coming in to Savannah to shop, do business or recreate.

The basis for the road impact fee would therefore be Savannah's cost for the improvements divided by all traffic generated within the city in 2045 (existing today plus new growth)—i.e., the cost per trip—times the traffic generated by new growth alone. For an individual land use, when a building permit is issued, the cost per trip would be applied to the number of trips that will be generated by the new development, assuring that new growth would only pay its 'fair share' of the road improvements that serve it.

Approach

This methodology proceeds along the following lines:

- Total traffic currently generated by Savannah residents and businesses in 2022 on the road system within the city is calculated from trip generation and commuting data. Various data sources are relied upon to determine current conditions, as explained in each appropriate section, below.
- Future Savannah-generated traffic from new growth in the city is calculated from housing unit and employment forecasts to 2045.
- The portion of total 2045 traffic that is generated by new housing units and employment in the city establishes the percentage of Savannah's cost of the future road improvements that can be included in an impact fee.

Summary Table

The table below shows how the portion of 2045 traffic generated by new growth is calculated. The figures represent all trips generated by land use, including pass-by and diverted trips.

Table C-1: Average Daily Trip Ends Generated by New Growth

	2022	2045	Increase	% New Growth Trip Ends
Residential Trips	590,526	707,847	117,321	
Nonresidential Trips	3,669,389	5,026,583	1,357,194	
Less: Internal Commutes*	(236,545)	(283,539)	(46,994)	
Net Trip Ends	**4,023,370**	**5,450,891**	**1,427,521**	**26.2%**

* Residents who work in Savannah. These trips to and from work are included in the residential trips.

The next table, below, calculates the Primary Trip Ends generated by existing and future traffic by deleting pass-by and diverted trips, as discussed below.

Table C-2: Primary Daily Trip Ends Generated by New Growth

	% Primary Trip Ends*	Primary Trip Ends			% New Growth Primary Trip Ends
		2022	2045	Increase	
Residential Trips	100%	590,526	707,847	117,321	
Commercial & Services	51%	1,776,348	2,447,059	670,710	
Industrial	92%	171,445	210,155	38,710	
Less: Internal Commutes	100%	(236,545)	(283,539)	(46,994)	
Net New Primary Trip Ends		**2,301,774**	**3,081,521**	**779,747**	**25.3%**

* Derived from'Trip Generation Handbook' chapter, *Trip Generation*, 11th Edition, Institute of Transportation Engineers.

Overall, new residents and businesses located within Savannah will generate 25.3% (more precisely, 25.3039666%) of all Savannah vehicles on its roads. Thus, new growth's 'fair share' of the cost to the City to provide road improvements to serve current and future traffic cannot exceed this figure.

Pass-by and Diverted Trips

The impact of new growth and development on Savannah's road network is the increased traffic added to the system, expressed by transportation engineers as 'trips'. Every 'trip' has two ends—a beginning at its origin and an end at its destination (known as 'trip ends'). There are three types of trips, defined as:

> A **Primary Trip** (and its trip ends)—a vehicle travelling from its original beginning to its intended final destination. Driving from one's home directly to one's place of work is an example of a primary trip.
>
> A **Pass-by Trip**—a vehicle travelling along its usual route from its origin to its final destination that stops off at an intermediate location for any reason. A trip from home to work that stops along the way for gas, dropping off a child at daycare, picking up coffee or dinner, or for any other reason, represents a 'pass-by' trip at the intermediate location.
>
> A **Diverted Trip** (previously called a diverted 'link' trip)—a vehicle that diverts from its normal primary route between its origin to its final destination, and takes a different route to stop off at an intermediate location for any reason. While a pass-by trip remains on its normal route, a diverted trip changes its route to other roads to arrive at the intermediate stop.

New primary trips add vehicles to the road network. Pass-by and diverted trips involve the same vehicles stopping off between their original beginnings and their final destinations, and therefore do not add new vehicles to the road network—the vehicles were already there on their way to their final destinations.

These different types of trips result in different types of 'trip ends'. On a home-to-daycare-to-work trip, for instance, there are two primary trip ends (home and work) and two pass-by or diverted trip ends: arriving at the daycare center and leaving from there to drive to work, for instance. The net impact on the road network, however, is created by the one vehicle and its two primary trip ends.

Impact fee calculations take note of these pass-by and diverted trip ends as not adding to the overall traffic on the road network and deletes them from the total trip ends reported in ITE's *Trip Generation* manual. While the table above uses overall average percentages of primary trip ends derived from ITE for broad land use categories, the actual percentage for each land use listed on the impact fee schedule for roads is applied to the total trip ends to determine the primary trip ends attributed to that particular land use.

The increase in primary trip ends shown on Table C-2 plays the most important role in calculating the per-trip road impact fee and defines new growth's share of traffic generated by residents and businesses located within the city.

Residential Trip Generation

Average trip generation rates published by the Institute of Transportation Engineers (ITE) differentiate between 'single-family detached housing' and 'apartments'. The closest correlations with the US Census definitions are 'single-family units' and 'multi-family units', which are shown on the following table.

Table C-3: Residential Units by Type: 2022 to 2045

	2019*	Percent**	Total in 2022***	Increase 2022-2045	Total in 2045
Single-Family Units	39,001	62.95%	43,959	8,734	52,693
Multi-Family Units	22,952	37.05%	25,870	5,139	31,009
Total	**61,953**	**100.00%**	**69,829**	**13,873**	**83,702**

* Based on most recent 5-Year American Community Survey 1-Year data report (Census Bureau).
** Percent of 2019 total housing units.
*** See Appendix A: Future Growth for housing unit projections.

The 2019 breakdown of housing units by type on the table above are taken from the most recent American Community Survey for Savannah (published by the Census Bureau). The 2019 percentage by housing type (single-family and multi-family) is calculated and applied to the total number of housing units projected in 2022 (taken from the Future Growth Appendix of this report). It is assumed that these percentages will persist into the future, producing a breakdown of the projected 13,873 new housing units forecast for the 2022-2045 period.

The next table, below, calculates the amount of traffic that is generated by the city's housing stock today, and the amount that will be generated in 2045.

Table C-4: Residential Trip Generation: 2022-2045 New Growth Increase

	ADT* Trip Ends	2022 Units	2022 ADT Trip Ends	2045 Units	2045 ADT Trip Ends	Increase 2021-2045	% New Growth Trip Ends
Single-Family Units	9.52	43,959	418,490	52,693	501,637	83,147	⇩
Multi-Family Units	6.65	25,870	172,036	31,009	206,210	34,174	
Total		**69,829**	**590,526**	**83,702**	**707,847**	**117,321**	**16.6%**

* Average Daily Traffic (trip ends) on a weekday; Institute of Transportation Engineers *Trip Generation*, 11th Edition. Total includes trips to/from work.

The calculations are made on the basis of 'average daily traffic' on a normal weekday, using average trip generation rates derived from multiple traffic studies (350 for single-family and 86 for apartments) and published by ITE. The rates are expressed for 'trip ends'—that is, traffic both leaving and coming to a housing unit.

Comparing traffic in 2022 to 2045, the future increase in trip ends can be calculated, which will represent 16.6% of all residential trip ends generated in the city.

It should be noted that the traffic generated includes trips to and from work and, more particularly, residents who commute to work at a business within the city.

Nonresidential Trip Generation

Calculating traffic generated by businesses located in Savannah is more problematical than residential trips because there is no breakdown of types of businesses in the city that is readily available. In addition, while employment forecasts have been made in terms of the number of jobs, there is no data available for floor areas, much less by detailed type of use.

The alternative is to view nonresidential traffic generation on a broad 'average' basis. For this, there is data available from ITE for a number of individual uses relating to the total number of trips generated per employee. These trips, of course, include not only trips taken by the employees (to/from work, lunch, etc.) but also customers and others that are attracted to the use, serve it or are served by it in some way.

The Average Daily Traffic (ADT) numbers on the following table, therefore, are calculated by dividing all trips to a use—employees, customers, deliveries to or from, etc.—by the number of employees alone. Since there is more data available for the average number of employees per 1,000 square feet of floor area, it enables a determination of the average total trips generated by the use by the same floor area (and thus the number per '1' square foot of floor area for impact fee calculations).

The table on the following page shows the 'trips per employee' per 1,000 square feet of floor area for those uses for which impact fees are commonly collected and for which the data is available.

Overall, the average trip generation rate of all uses shown on the following table is 4.36 total trips per employee for 'industrial' uses and 23.95 for all 'commercial' uses. The 'industrial' category includes such uses as manufacturing and assembly, storage and transportation of goods; the 'commercial' category includes all sales and service uses such as stores, offices, motels, banks, amusements, and private institutions). The last column shows the average rate for all 'commercial' uses listed, as opposed to the 'industrial' uses shown in the column on its left.

Although the 'overall' averages are useful for projecting total traffic generation, impact fees for particular uses will reflect the actual average trip generation rate for the specific use.

Table C-5: ITE Trips-per-Employee Data

	ITE Code	Land Use	ADT Trip Ends per Employee	Average by Category	Average All Commercial
Industrial (100-199)	110	General Light Industrial	3.10	4.36	23.95
	140	Manufacturing	2.51		
	150	Warehousing	5.05		
	156	High-Cube Hub Warehouse	6.77		
	180	Specialty Trade Contractor	3.63		
Lodging (300-399)	310	Hotel or Conference Motel	14.34	13.58	
	320	Motel	12.81		
Recreational (400-499)	445	Movie Theater	55.12	38.03	
	480	Amusement Park	24.02		
	491	Racquet/Tennis Club	45.71		
	495	Recreational Community Center	27.25		
Institutional (500-599)	560	Church/Place of Worship	20.02	33.05	
	565	Day Care Center	21.38		
	566	Cemetery	57.75		
Medical (600-699)	610	Hospital	3.77	6.99	
	620	Nursing Home	3.31		
	630	Clinic	13.90		
Office (700-799)	710	General Office Building	3.33	4.27	
	714	Corporate Headquarters Building	2.31		
	715	Single-Tenant Office Building	3.85		
	720	Medical-Dental Office Building	8.71		
	760	Research and Development Center	3.37		
	770	Business Park	4.04		
Retail (800-899)	812	Building Materials and Lumber Store	24.77	30.35	
	814	Variety Store	95.59		
	815	Free-Standing Discount Store	24.63		
	816	Hardware/Paint Store	27.69		
	817	Nursery (Garden Center)	21.83		
	818	Nursery (Wholesale)	23.40		
	820	Shopping Center	17.42		
	826	Strip Retail Plaza	25.63		
	840	Automobile Sales (New)	11.20		
	843	Auto Parts Store	33.73		
	848	Tire Store	16.78		
	850	Supermarket	43.86		
	857	Discount Club	32.21		
	861	Sporting Goods Superstore	4.44		
	881	Pharmacy/Drugstore w/drive-through	69.17		
	890	Furniture Store	10.93		
Services (900-999)	912	Drive-in Bank	32.73	**25.19**	
	932	High-Turnover (Sit-Down) Restaurant	21.26		
	934	Fast-Food Restaurant	44.52		
	941	Quick Lubrication Vehicle Shop	16.00		
	943	Automobile Parts & Service	11.44		

Source: *Trip Generation*, 11th Edition, Institute of Transportation Engineers, where survey results given for key land uses.

The next table provides a breakdown between commercial and industrial employment in the city and calculates trip ends generated by each.

The number of employees in the city in 2022 and 2045 are summarized from the detailed employment forecasts presented in Appendix A for the two employment categories on the table.

Table C-6: Nonresidential Trip Generation: 2022-2045 New Growth Increase

	Avgerage ADT	2022 Employees	2022 Trip Ends	2045 Employees	2045 Trip Ends	2021-2045 Increase	% New Growth Trip Ends
Commercial & Services	23.95	145,403	3,483,036	200,304	4,798,154	1,315,118	
Industrial*	4.36	42,766	186,353	52,422	228,429	42,076	
Total		188,169	3,669,389	252,726	5,026,583	1,357,194	
Less: Internal Commutes at 40.06%			(236,545)		(283,539)	(46,994)	
Net Nonres Trip Ends			**3,432,844**		**4,743,044**	**1,310,200**	**27.6%**

* Industrial includes utilities, manufacturing, wholesale trade, and transportation & warehousing.

The table calculates the total number of trips using the average rates for commercial and industrial from the ITE Trips-per-Employee Data table on the previous page. From the total of all nonresidential trips is deducted the number of trips to/from work generated by city residents, since these trips have already been calculated as part of the residential trip generation rates (i.e., city residents driving to/from work at city establishments).

The results of the residential and nonresidential trip generation analyses are combined on the Summary table at the beginning of this Appendix Section for an overall calculation of new growth's share of future traffic generated by Savannah residents and businesses. From these figures, pass-by and diverted trip ends are then deleted to determine primary trip ends, which more closely relates to vehicles on the road and thus contribute to traffic congestion.

Terminology

This Traffic Demand Section uses the term 'average daily traffic' (ADT) for a weekday, which is defined by ITE as the 'average weekday vehicle trip ends', which are "the average 24-hour total of all vehicle trips counted from a study site from Monday through Friday."

Additionally, ITE defines a 'trip or trip end' as "a single or one-direction vehicle movement with either the origin or the destination (exiting or entering) inside a study site. For trip generation purposes, the total trip ends for a land use over a given period of time are the total of all trips entering plus all trips exiting a site during a designated time period".

Lastly, ITE defines 'average trip rate' as "the weighted average of the number of vehicle trips or trip ends per unit of independent variable (for example, trip ends per occupied dwelling unit or employee) using a site's driveway(s). The weighted average rate is calculated by dividing the sum of all independent variable units where paired data is available. The weighted average rate is used rather than the average of the individual rates because of the variance within each data set or generating unit. Data sets with a large variance will over-influence the average rate if they are not weighted".

Appendix D: Cost Adjustments and Credits

Cost Adjustments

Calculations related to impact fees are made in terms of the 'present value' of past and future amounts of money, including project cost expenditures and future revenue credits.

The Georgia Development Impact Fee Act defines 'present value' as "the current value of past, present, or future payments, contributions or dedications of goods, services, materials, construction, or money." This Appendix describes the methodologies used to make appropriate adjustments to project cost figures, both past and future, to convert these costs into current dollars when such an adjustment is appropriate.

Calculations for present value (PV) differ when considering past expenditures versus future costs. In both cases, however, the concept is the same—the 'actual' expenditure made or to be made is adjusted to the current year (2021) using an inflation rate to bring past expenditures up to current values, and a deflator for future costs representing interest that would be added to funds being saved up until the expenditure is to be made. In essence, the present value is considered in light of the value of money as it changes over time.

Past Expenditures

Past expenditures are considered in impact fee calculations only for previous expenditures for projects that created capacity for new development and are being recouped. An expenditure that was made in the past is converted to PV using the inflation rate of money—in this case the Consumer Price Index (CPI). Although this approach ignores the value of technological innovation (i.e., better computers are available today for the same or lower historic prices) and evolving land prices (often accelerated beyond inflation by market pressures), the approach best captures the value of the money actually spent. For instance, it is not important that you can buy a better computer today for the same price that was paid 5 years ago; what is important is the money was spent 5 years ago and what that money would be worth today had it been saved instead of spent.

Future Project Costs

In order to determine the present value of a project expenditure that will be made in the future, the Net Present Value (NPV) of the expenditure is determined. To calculate the NPV of any project cost, two figures are needed—the future cost of the project anticipated in the year the expenditure will be made, and the Net Discount Rate. Given the current cost of a project, that cost is first inflated into the future to the target expenditure year to establish the estimated future cost. The future cost is then deflated to the present using the Net Discount Rate, which establishes the NPV for the project in current dollars. These two formulas are:

$$\text{Future Cost} = \text{Current Cost} \times (1 + \text{Inflation Rate})^{\text{Year of Expenditure} - \text{Current Year}}$$

$$\text{Net Present Value} = \text{Future Cost} \times (1 + \text{Net Discount Rate})^{\text{Current Year} - \text{Year of Expenditure}}$$

In this Appendix, two important adjustments are discussed that are required to convert current cost estimates into future cost figures, and then back into current dollars. First, an appropriate cost inflator is identified. This adjustment factor is important in determining the future cost of a project, based on current cost estimates. The cost inflator may be based on anticipated inflation in construction or building costs, or on anticipated inflation in the value of money (for capital projects that do not include a construction component). In essence, costs increase over time. By identifying the appropriate inflation rate that is related to the type of project (building construction, project

construction or non-construction), current 2021 estimates can be used to predict future costs in the year they are expected to occur.

The second cost adjustment is a deflator—the Net Discount Rate. In essence, the Net Discount Rate is the interest rate that accrues to monies being held in escrow. That is, as impact fees are collected and 'saved up' over the years for the future expenditure, they increase at the rate that the account is accruing interest. Having determined the inflated cost of a project at some future date, the cost in today's dollars can be reduced to the extent that interest will increase the funds on hand. In essence, the calculation determines how much money needs to be added to the account so that, with interest, it will grow to the amount needed for that future expenditure at that time. This is the Net Present Value of that future expenditure.

Cost Inflators

Three different cost inflators are used in the impact fee calculations, based on the type of project being considered.

For projects that require construction of a structure (such as a fire station), a 'building cost inflator' is used as the appropriate inflation rate.

For infrastructure projects, such as roads or ball fields, a 'construction cost inflator' is used.

For all non-construction types of projects (such as a fire truck or park land), an inflation rate is used that is based on the Consumer Price Index. These different types of inflators are discussed below.

Engineering News-Record's Cost Indexes

The Engineering News-Record (ENR)[4] publishes both a Building Cost Index (BCI) and a Construction Cost Index (CCI), both of which are widely used in the construction industry. The indexes are based on monthly and annual cost increases of various construction materials and applicable labor rates, and are calibrated regionally.

[4] Engineering News-Record is a magazine devoted to providing those in the construction business with up to date information concerning innovations and policy changes related to their field of work. This includes tracking monthly increases in the relative costs of construction and building projects, as well as features on the business and management aspects of construction

Building Cost Inflator

Table D-1 presents a calculation of the annual average rate of increase reflected in the construction costs of a building. For this analysis, the 2011-2021 ten-year period is used as a base time period for an estimate of average future construction cost increases due to inflation in labor and materials costs.

Table D-1: Building Cost Inflator - BCI

Year	Amount	BCI*		Effect of Inflation	
		1913=100	2010=1.0	BCI	Avg. Rate =
					2.4511014%
2011	$ 100,000.00	3,837.47	1.000000	$ 100,000.00	$ 100,000.00
2012		3,970.93	1.034779	$ 103,477.88	$ 102,451.10
2013		4,022.11	1.048115	$ 104,811.46	$ 104,962.28
2014		4,076.81	1.062369	$ 106,236.92	$ 107,535.01
2015		4,108.05	1.070509	$ 107,050.89	$ 110,170.81
2016		4,126.72	1.075375	$ 107,537.52	$ 112,871.20
2017		4,278.39	1.114899	$ 111,489.95	$ 115,637.79
2018		4,408.94	1.148918	$ 114,891.82	$ 118,472.19
2019		4,523.59	1.178795	$ 117,879.51	$ 121,376.06
2020		4,615.43	1.202727	$ 120,272.71	$ 124,351.12
2021		5,816.76	1.515780	$ 151,577.99	$ 127,399.09
				$ 1,245,226.65	$ 1,245,226.65

* Building Cost Index, Atlanta Region.
Source: *Engineering News Record* , Annual Average Indices.

Table D-1 assumes a building construction project that cost $100,000 in 2011, and how much the same project would cost in each subsequent year due to inflation using the Building Cost Index published by ENR for the Atlanta area.

Setting the 2011 Building Cost Index (BCI) at '1.0,' the increase in the BCI as a multiple of 2011 is also shown on the table. The equivalent cost of the same project in each subsequent year is calculated by multiplying the BCI multiplier times $100,000.

When the total for all such projects is summed for the 2011-2021 period, the equivalent average annual rate of increase is calculated as the percentage that would produce the same total. This percentage is used in the text of this report as the applicable inflator for building construction projects that will begin in future years.

Construction Cost Inflator

The inflator for future construction costs for other types of projects is based on ENR's Construction Cost Index.

Table D-2 presents a calculation of the annual average rate of increase reflected in the cost of construction of a capital project other than a building. (These would include such projects as road improvements, trails, baseball fields and other projects that do not involve buildings.) For this analysis, the 2011-2021 ten-year period is also used as a base time period for an estimate of average future construction cost increases due to inflation in labor and materials costs. The Construction Cost 10-year average inflation rate is calculated in the same manner as described above for the Building Cost Inflator.

Table D-2: Construction Cost Inflator - CCI

Year	Amount	CCI*		Effect of Inflation	
		1913=100	2010=1.0	CCI	Avg. Rate =
					1.6291673%
2011	$ 100,000.00	5,829.65	1.000000	$ 100,000.00	$ 100,000.00
2012		5,892.64	1.015118	$ 101,511.78	$ 101,629.17
2013		5,983.23	1.026087	$ 102,608.66	$ 103,284.88
2014		6,147.52	1.041861	$ 104,186.15	$ 104,967.56
2015		6,245.74	1.070469	$ 107,046.94	$ 106,677.66
2016		6,277.14	1.087572	$ 108,757.20	$ 108,415.61
2017		6,433.18	1.093039	$ 109,303.91	$ 110,181.89
2018		6,592.98	1.120212	$ 112,021.20	$ 111,976.93
2019		6,681.50	1.148037	$ 114,803.70	$ 113,801.23
2020		6,750.41	1.163450	$ 116,345.04	$ 115,655.24
2021		7,414.97	1.175450	$ 117,545.04	$ 117,539.45
				$ 1,194,129.62	$ 1,194,129.62

* Construction Cost Index, Atlanta Region.
Source: *Engineering News Record* , Annual Average Indices.

CPI Inflator

For projects that do not involve construction, only the future value of money needs to be considered (without regard to inflation in labor or materials costs). For this calculation, the Consumer Price Index (CPI) is used, assuming past experience will continue into the foreseeable future.

By 2021 the CPI had risen considerably over the 1982 CPI. The first column under the 'CPI' heading on Table D-3 shows the average annual CPI figures. Using 2021 as the base (2021=1.0), the second column under 'CPI' on the table shows the multipliers that would convert an amount of money spent in each year into current present value dollars.

Table D-3 shows the CPI figures for every year since 1982.

Table D-3: Non-Construction Cost Inflator - CPI

Year	Amount	CPI* 1982-84=100	CPI* 2020=1.0	Present Value: CPI	Long Term Inflator = 2.49984150%	10-Year Inflator =
1982	$ 10,000.00	96.50	2.88029	$ 28,802.90	$ 26,194.17	
1983	$ 10,000.00	99.60	2.79064	$ 27,906.43	$ 25,555.32	
1984	$ 10,000.00	103.90	2.67515	$ 26,751.49	$ 24,932.06	
1985	$ 10,000.00	107.60	2.58316	$ 25,831.60	$ 24,324.00	
1986	$ 10,000.00	109.60	2.53602	$ 25,360.22	$ 23,730.77	
1987	$ 10,000.00	113.60	2.44673	$ 24,467.25	$ 23,152.00	
1988	$ 10,000.00	118.30	2.34952	$ 23,495.18	$ 22,587.36	
1989	$ 10,000.00	124.00	2.24152	$ 22,415.16	$ 22,036.48	
1990	$ 10,000.00	130.70	2.12661	$ 21,266.11	$ 21,499.04	
1991	$ 10,000.00	136.20	2.04073	$ 20,407.34	$ 20,974.70	
1992	$ 10,000.00	140.30	1.98110	$ 19,810.98	$ 20,463.16	
1993	$ 10,000.00	144.50	1.92352	$ 19,235.16	$ 19,964.09	
1994	$ 10,000.00	148.20	1.87549	$ 18,754.93	$ 19,477.19	
1995	$ 10,000.00	152.40	1.82381	$ 18,238.06	$ 19,002.16	
1996	$ 10,000.00	156.90	1.77150	$ 17,714.98	$ 18,538.72	
1997	$ 10,000.00	160.50	1.73176	$ 17,317.63	$ 18,086.59	
1998	$ 10,000.00	163.00	1.70520	$ 17,052.02	$ 17,645.48	
1999	$ 10,000.00	166.60	1.66836	$ 16,683.55	$ 17,215.13	
2000	$ 10,000.00	172.20	1.61410	$ 16,141.00	$ 16,795.27	
2001	$ 10,000.00	177.10	1.56944	$ 15,694.41	$ 16,385.66	
2002	$ 10,000.00	179.90	1.54501	$ 15,450.14	$ 15,986.03	
2003	$ 10,000.00	184.00	1.51059	$ 15,105.87	$ 15,596.15	
2004	$ 10,000.00	188.90	1.47140	$ 14,714.03	$ 15,215.78	
2005	$ 10,000.00	195.30	1.42318	$ 14,231.85	$ 14,844.69	
2006	$ 10,000.00	201.60	1.37871	$ 13,787.10	$ 14,482.65	
2007	$ 10,000.00	207.34	1.34053	$ 13,405.29	$ 14,129.43	
2008	$ 10,000.00	215.30	1.29096	$ 12,909.62	$ 13,784.83	
2009	$ 10,000.00	214.54	1.29557	$ 12,955.71	$ 13,448.64	2.580330%
2010	$ 10,000.00	218.06	1.27466	$ 12,746.63	$ 13,120.64	
2011	$ 10,000.00	224.94	1.23566	$ 12,356.59	$ 12,800.65	$ 12,901.52
2012	$ 10,000.00	229.59	1.21061	$ 12,106.07	$ 12,488.46	$ 12,576.99
2013	$ 10,000.00	232.96	1.19313	$ 11,931.30	$ 12,183.88	$ 12,260.63
2014	$ 10,000.00	236.74	1.17408	$ 11,740.84	$ 11,886.73	$ 11,952.22
2015	$ 10,000.00	237.02	1.17269	$ 11,726.92	$ 11,596.83	$ 11,651.57
2016	$ 10,000.00	240.01	1.15808	$ 11,580.82	$ 11,313.99	$ 11,358.49
2017	$ 10,000.00	245.12	1.13393	$ 11,339.26	$ 11,038.06	$ 11,072.77
2018	$ 10,000.00	251.11	1.10689	$ 11,068.91	$ 10,768.86	$ 10,794.25
2019	$ 10,000.00	255.66	1.08719	$ 10,871.93	$ 10,506.22	$ 10,522.72
2020	$ 10,000.00	261.56	1.06265	$ 10,626.55	$ 10,249.98	$ 10,258.03
2021	$ 10,000.00	277.95	1.00000	$ 10,000.00	$ 10,000.00	$ 10,000.00
1982-21	$ 400,000.00			$ 674,001.84	$ 674,001.84	
2011-21	$ 110,000.00			**$ 125,349.20**	⟷	**$ 125,349.20**

*Consumer Price Index data is from the U. S. Department of Labor, Bureau of Labor Statistics.

Using an annual expenditure of $10,000 as an example, the multipliers on Table D-3 yield the figures shown for the CPI on the table under the 'present value' heading. Cumulatively, the $400,000 spent over the 1982-2021 period would have a total present value of $674,001.84 in today's dollars. Considering the present value figures for the $10,000 annual expenditures, an average annual inflation rate of almost 2.5% yields the same total amount over the 1982-2021 period.

The 39-year average of annual CPI change (the period of 1982-2021) shown on Table D-3 would be useful in estimating the present value (PV) of past expenditures, but would not be the best indicator of future change because of the long time-frame covered. Looking only at the change in CPI for the 10 years from 2011 to 2021, an average annual inflation rate of almost 2.6% best captures the change over that period. Even though this 10-year rate is somewhat skewed by the 2021 one-year rate influenced by the pandemic, this rate (compared to the 1982-2021 period) is assumed to be experienced 'on average' in future years, and is used for inflator calculations for future non-construction expenditures where the value of money is the issue.

Calculating Net Present Value

Determining the NPV of future project expenditures depends on the type of 'project' being funded, as discussed above. Specifically ….

- For a building construction project (such as a fire station), the current cost estimate for the project is inflated into the future using the average Building Cost Inflator (from Table D-1) applied to the number of years until the year planned for its construction. This future cost is then deflated back to the present using the Net Discount Rate (currently 0.00005%) since this reflects the present value of a future amount of money.
- For other construction projects (such as recreation facilities and roads), the current cost estimate for the project is inflated into the future using the average Construction Cost Inflator (from Table D-2) applied to the number of years until the year planned for its construction. Like building construction projects, this future cost is then deflated back to the present using the Net Discount Rate.
- For non-construction capital projects (such as fire truck purchases or land acquisition), the 10-year average CPI inflator is used to estimate the project expenditure in future dollars while, again, the Net Discount Rate is applied to deflate that future cost to present value.

Property Tax Credits

The Georgia Development Impact Fee Act is very clear that new growth and development cannot be charged more in impact fees than their 'fair share' of the cost of providing public faculties needed to serve that new growth. The calculation of that 'fair share' is intrinsic to the impact fee calculations carried out in the chapters addressing each public facility category.

Ineligible Impact Fee Project Amounts

In some cases, a project included in the impact fee program may not be 100% impact fee eligible. This is caused by projects that will also serve today's existing development, for which other revenue (such as property taxes) would be needed to cover the existing development's share of the project cost. Under normal circumstances, taxes generated by existing development would be used to cover existing development's 'fair share' of the project costs.

As new growth and development comes online in the future, however, it will also be generating tax revenue. To the extent that new growth will be contributing taxes for non-eligible portions of impact fee projects (for which they are not financially responsible), a credit must be applied reflecting the allocation of those tax collections in order to avoid new growth paying more than their 'fair share' of total costs.

Property Tax Base

Table D-4 shows the most recently available tax base figures for the city reported by the state. Land uses are taxed at 40% of their actual value, so the table also shows the actual values for each category.

Table D-4: Savannah Tax Digest - 2020

Category	Total Assessed Value (@40%)	Total Tax Valuation (100% value)
Residential	$ 2,721,799,885	$ 6,804,499,713
Agricultural	13,648,047	34,120,118
Conservation Use	3,572,960	8,932,400
Forest Conservation	1,514,800	3,787,000
Environmentally Sensitive	1,382,720	3,456,800
Commercial	3,039,613,697	7,599,034,243
Industrial	725,678,051	1,814,195,128
Utility	159,103,782	397,759,455
Motor Vehicles	35,074,430	87,686,075
Mobile Home	1,797,538	4,493,845
Timber 100%	434,200	1,085,500
Heavy Equipment	142,677	356,693
Brownfield	28,111,880	70,279,700
Exemptions (M&O)	(607,462,123)	(1,518,655,308)
Net M&O Digest	$ 6,124,412,544	$ 15,311,031,360

Source: Georgia Dept. of Revenue, Consolidated Savannah Tax Digest.

Tax Base Projections

In the following table, the total value added to the tax base by impact fee eligible new growth and development throughout the city is calculated out to 2045. Homestead and other exemptions are not considered, nor are employment increases in types of jobs that are not subjected to impact fees.

Table D-5: New Growth Added Value - City of Savannah

Year	Residential			Non-Residential			Total Annual Added Assessed Value
	Total Housing Units	New Housing Units*	Added Assessed Value	Total Employees	New Employees	Added Assessed Value**	
2021	69,004	915	$ 48,356,835	129,841	2,090	$ 45,012,330	$ 93,369,165
2022	69,829	825	$ 43,600,425	131,923	2,083	$ 44,861,571	$ 88,461,996
2023	70,617	788	$ 41,645,012	133,962	2,039	$ 43,913,943	$ 85,558,955
2024	71,372	755	$ 39,900,995	136,002	2,040	$ 43,935,480	$ 83,836,475
2025	72,095	723	$ 38,209,827	138,041	2,039	$ 43,913,943	$ 82,123,770
2026	72,794	699	$ 36,941,451	140,084	2,043	$ 44,000,091	$ 80,941,542
2027	73,474	680	$ 35,937,320	142,117	2,033	$ 43,784,721	$ 79,722,041
2028	74,136	662	$ 34,986,038	144,157	2,040	$ 43,935,480	$ 78,921,518
2029	74,769	633	$ 33,453,417	146,196	2,039	$ 43,913,943	$ 77,367,360
2030	75,379	610	$ 32,237,890	148,234	2,038	$ 43,892,406	$ 76,130,296
2031	75,973	594	$ 31,392,306	150,190	1,956	$ 42,126,372	$ 73,518,678
2032	76,547	574	$ 30,335,326	152,147	1,957	$ 42,147,909	$ 72,483,235
2033	77,108	561	$ 29,648,289	154,104	1,957	$ 42,147,909	$ 71,796,198
2034	77,657	549	$ 29,014,101	156,061	1,957	$ 42,147,909	$ 71,162,010
2035	78,198	541	$ 28,591,309	158,020	1,959	$ 42,190,983	$ 70,782,292
2036	78,736	538	$ 28,432,762	159,969	1,949	$ 41,975,613	$ 70,408,375
2037	79,273	537	$ 28,379,913	161,927	1,958	$ 42,169,446	$ 70,549,359
2038	79,805	532	$ 28,115,668	163,883	1,956	$ 42,126,372	$ 70,242,040
2039	80,329	524	$ 27,692,876	165,841	1,958	$ 42,169,446	$ 69,862,322
2040	80,853	524	$ 27,692,876	167,796	1,955	$ 42,104,835	$ 69,797,711
2041	81,395	542	$ 28,644,158	169,673	1,877	$ 40,424,949	$ 69,069,107
2042	81,957	562	$ 29,701,138	171,552	1,879	$ 40,468,023	$ 70,169,161
2043	82,533	576	$ 30,441,024	173,429	1,877	$ 40,424,949	$ 70,865,973
2044	83,119	586	$ 30,969,514	175,308	1,879	$ 40,468,023	$ 71,437,537
2045	83,702	583	$ 30,810,967	177,185	1,877	$ 40,424,949	$ 71,235,916

*New housing value is estimated at an assessed value per housing unit of: $52,849
**Nonresidential value is estimated at an assessed value per employee of: $21,537

New houses recently sold throughout the city[5] were going for an overall average sales price of $393,085, which would be a tax assessment value of $157,234 at 40%. Multifamily units issued building permits in 2021 totaled 1,249 units at a total construction cost of $149,623,894. Together, the 1,308 new housing units averaged $132,122 which, at 40%, represents a per-unit assessed value of $52,849.

[5] On December 30, 2021, Zillow reported that 59 new houses had been sold during 2021, all of which were new construction that had been built during 2021. Actual sales prices ranged from a high of $925,000 for a 3,376 sq. ft. 4-bedroom house to a 3-bedroom 1,400 sq. ft. house for $190,000.

Nonresidential value added on Table D-5 is calculated as the assessed value of all commercial, industrial, and utility property on the 2020 Digest divided by the current number of 'value-added' jobs in the city, resulting in a figure of $21,537 in assessed value per employee.

The value added is expressed in *assessed* value; as noted above, this is 40% of the market or appraised value. Millage rates are applied to assessed value, rather than appraised. These assessed values are applied to new growth (new housing units and new 'value-added' employment) to calculate the total increases each year in assessed value generated by new growth.

In Table D-6, the property tax base of the city as a whole is forecast to the year 2045. This is a combination of the tax digest base year from Table D-4 and the annual increase in assessed property value generated by new growth and development from Table D-5. Importantly, the figures shown on Table D-6 are 'current value' figures and do not account for future reassessments or the effects of inflation on future resales.

Table D-6: Savannah Tax Base Growth

Year	Total City Tax Base (Net 2020 M&O Digest)	Total Annual Assessed Value Added*	Net City Tax Digest (40% value)	Total Tax Base Generated by New Growth	Percent Generated by New Growth
2020	$ 6,124,412,544				
2021	$ 6,206,989,238				
2022	$ 6,285,720,318	$ 78,731,080	$ 6,285,720,318	$ 78,731,080	1.25%
2023		$ 76,264,456	$ 6,361,984,774	$ 154,995,535	2.44%
2024		$ 74,931,212	$ 6,436,915,986	$ 229,926,748	3.57%
2025		$ 73,595,949	$ 6,510,511,935	$ 303,522,696	4.66%
2026		$ 72,696,802	$ 6,583,208,737	$ 376,219,498	5.71%
2027		$ 71,701,407	$ 6,654,910,144	$ 447,920,905	6.73%
2028		$ 71,113,195	$ 6,726,023,339	$ 519,034,100	7.72%
2029		$ 69,901,093	$ 6,795,924,432	$ 588,935,194	8.67%
2030		$ 68,935,315	$ 6,864,859,747	$ 657,870,509	9.58%
2031		$ 66,512,418	$ 6,931,372,166	$ 724,382,928	10.45%
2032		$ 65,712,876	$ 6,997,085,042	$ 790,095,804	11.29%
2033		$ 65,179,175	$ 7,062,264,217	$ 855,274,979	12.11%
2034		$ 64,686,528	$ 7,126,950,745	$ 919,961,506	12.91%
2035		$ 64,401,170	$ 7,191,351,915	$ 984,362,676	13.69%
2036		$ 64,062,638	$ 7,255,414,553	$ 1,048,425,314	14.45%
2037		$ 64,215,417	$ 7,319,629,970	$ 1,112,640,732	15.20%
2038		$ 63,967,073	$ 7,383,597,043	$ 1,176,607,805	15.94%
2039		$ 63,681,716	$ 7,447,278,759	$ 1,240,289,521	16.65%
2040		$ 63,617,105	$ 7,510,895,864	$ 1,303,906,626	17.36%
2041		$ 62,676,190	$ 7,573,572,054	$ 1,366,582,815	18.04%
2042		$ 63,540,343	$ 7,637,112,397	$ 1,430,123,158	18.73%
2043		$ 64,072,024	$ 7,701,184,421	$ 1,494,195,183	19.40%
2044		$ 64,525,638	$ 7,765,710,058	$ 1,558,720,820	20.07%
2045		$ 64,359,402	$ 7,830,069,460	$ 1,623,080,222	20.73%

*Total nonresidential assessed value added plus non-exempt residential total.

Also shown on Table D-6 in the last two columns is the amount of the total tax base generated only by new growth and development. The percentage of the tax base contribution from new growth associated with each year are used in calculating the amount of a credit for taxes paid by new development for the portion of an impact fee project that is not eligible for impact fee funding, as discussed at the beginning of this Section. These percentages are used for credit calculations in the public safety (fire protection and law enforcement) and roads service calculations, since both residential and nonresidential development pay impact fees for those public facility categories.

Since parks & recreation impact fees are levied only on residential uses, Table D-7 has been prepared showing the net increase in taxable value for residential properties only.

Table D-7: Residential Tax Base Growth

Year	Residential Tax Base (Net Digest)*	Net Annual Added Residential Assessed Value**	Net Residential Tax Digest (40% value)	Residential Tax Base Generated by New Growth	Percent Generated by New Growth
2020	$ 2,114,337,762				
2021	$ 2,151,902,126				
2022	$ 2,185,771,635	$ 33,869,509	$ 2,185,771,635	$ 33,869,509	1.55%
2023		$ 32,350,513	$ 2,218,122,148	$ 66,220,021	2.99%
2024		$ 30,995,732	$ 2,249,117,880	$ 97,215,754	4.32%
2025		$ 29,682,006	$ 2,278,799,886	$ 126,897,759	5.57%
2026		$ 28,696,711	$ 2,307,496,597	$ 155,594,470	6.74%
2027		$ 27,916,686	$ 2,335,413,283	$ 183,511,156	7.86%
2028		$ 27,177,715	$ 2,362,590,998	$ 210,688,871	8.92%
2029		$ 25,987,150	$ 2,388,578,148	$ 236,676,022	9.91%
2030		$ 25,042,909	$ 2,413,621,057	$ 261,718,931	10.84%
2031		$ 24,386,046	$ 2,438,007,104	$ 286,104,978	11.74%
2032		$ 23,564,967	$ 2,461,572,071	$ 309,669,945	12.58%
2033		$ 23,031,266	$ 2,484,603,337	$ 332,701,211	13.39%
2034		$ 22,538,619	$ 2,507,141,956	$ 355,239,829	14.17%
2035		$ 22,210,187	$ 2,529,352,143	$ 377,450,016	14.92%
2036		$ 22,087,025	$ 2,551,439,168	$ 399,537,041	15.66%
2037		$ 22,045,971	$ 2,573,485,139	$ 421,583,013	16.38%
2038		$ 21,840,701	$ 2,595,325,840	$ 443,423,714	17.09%
2039		$ 21,512,270	$ 2,616,838,110	$ 464,935,984	17.77%
2040		$ 21,512,270	$ 2,638,350,380	$ 486,448,254	18.44%
2041		$ 22,251,241	$ 2,660,601,621	$ 508,699,494	19.12%
2042		$ 23,072,320	$ 2,683,673,941	$ 531,771,814	19.82%
2043		$ 23,647,075	$ 2,707,321,016	$ 555,418,890	20.52%
2044		$ 24,057,615	$ 2,731,378,630	$ 579,476,504	21.22%
2045		$ 23,934,453	$ 2,755,313,083	$ 603,410,957	21.90%

* Residential total, minus Homestead and related residential exemptions.
** Total added assessed value discounted for exemptions.