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July, 2008

# Fiscal Impacts of Development: Literature Review and Discussion

Troy D Mix, *University of Illinois at Urbana-Champaign*  
Rachael Hurley



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**An IPA Planning Services Report**

**Fiscal Impacts of  
Development:  
Literature Review and  
Discussion**

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*written by*

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*and*

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Institute for Public Administration  
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## **Preface**

As Director of the Institute for Public Administration (IPA) at the University of Delaware, I am pleased to provide the *Fiscal Impacts of Development: Literature Review and Discussion* report. Its development was funded by Delaware's Office of Management and Budget (OMB), through an ongoing partnership with OMB's Budget Development, Planning and Administration division and the Office of State Planning Coordination. This report will serve to inform state and local efforts in understanding the government cost and revenue implications of development.

This project reviewed literature discussing the fiscal impacts of development and offers relevant commentary and recommendations in light of Delaware's governance and growth characteristics. Chapter 1 reviews a broad set of literature outlining the fiscal impacts of growth and development, describes Delaware's relatively unique governance characteristics, and discusses the distribution of the fiscal impacts of development across Delaware's state and local governments. Chapter 2 describes and presents analysis of the various fiscal-impact-analysis methods used by governments to estimate the cost and revenue impacts of development. Chapter 3 outlines fiscal-impact-analysis applications that could be implemented by Delaware's state, county, and municipal governments, offering several recommended first steps that would aid implementation. Finally, the annotated bibliography in the Appendix should prove a valuable resource for future research as it lists and briefly summarizes references reviewed for this report.

IPA is committed to supporting Delaware's state and local governments in their efforts to tackle the myriad challenges accompanying growth and development. It is my hope that this report will provide Delaware residents and governments guidance in understanding the fiscal impacts of development in their jurisdictions.

Jerome R. Lewis, Ph.D.  
Director, Institute for Public Administration

## **Institute for Public Administration**

This report was prepared by the Institute for Public Administration (IPA), a unit within the College of Human Services, Education & Public Policy at the University of Delaware. IPA links the research and resources of the University of Delaware with the management and information needs of local, state, and regional governments in the Delaware Valley. IPA provides assistance to agencies and local governments through direct staff assistance and research projects as well as training programs and policy forums.

IPA staff member Troy Mix and IPA graduate research assistant Rachael Hurley authored this report. Mr. Mix functioned as project manager, wrote much of the report, and supervised the overall research and drafting effort. Ms. Hurley provided substantial project research and writing support, researching and drafting section 1-1 and compiling the annotated bibliography appearing in the Appendix.

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## **Executive Summary**

A few simple premises about growth and development directed the preparation of this report. First, regional growth and development certainly brings with it a whole host of benefits and costs. From a positive perspective, growth and development can provide residents with additional choices of where to live, work, and shop. It can generate new jobs, new tax revenue, and higher incomes and property values. However, growth and development can also create negative consequences, ranging from degraded environmental quality and increased traffic congestion to the loss of rural and historic character. Also, there is far from complete agreement on what constitutes good or bad growth. One person may aspire to live in a large home in a rural area, while another may derisively refer to such a home as a “McMansion.” Finally, reasonable people, regardless of their favorite housing style, tend to agree that growth and development does have a significant impact on state and local governments’ budgets. At the most basic level, increased population leads to increased costs.

Simply acknowledging that growth has fiscal implications for state and local governments is not enough. The implications of growth must be clearly illustrated to allow everyone from the policy-maker to the concerned citizen the opportunity to make sound, informed decisions. This report promotes the use of fiscal-impact-analysis techniques to encourage greater understanding of the magnitude and incidence of development’s impact on government revenues and expenditures.

The literature review in Chapter 1 reports that development’s location, density, and design has a significant impact on the fiscal implications of growth. Fiscally unbeneficial development patterns tend to take place in locations far away from existing infrastructure, in a low-density fashion, with little or no mix of residential and commercial uses. More fiscally beneficial development patterns tend to take place in established growth areas in a higher-density fashion with residential uses located in close proximity to employment, shopping, and service destinations. Development specifically impacts the government expenditures necessary to provide capital infrastructure, operating infrastructure, and on-demand operating items. Compared to other states, Delaware is responsible for a larger percentage of the cost for typically local services and infrastructure. Despite significant state expenditures on local items, Delaware’s budget is not particularly sensitive to the development process. This situation creates the need for the state to play an active role in the land-use and development process.

Chapter 2 describes and presents analysis of the various fiscal-impact-analysis methods used by governments to estimate the cost and revenue impacts of development. Average-cost and marginal-cost approaches are the two basic fiscal-impact-analysis methods. They differ in that average-cost approaches calculate “per-unit” costs of development while marginal-cost approaches calculate “next-unit” costs of development. There are three specific methods for each approach—Per Capita Multiplier, Service Standard, and Proportional Valuation techniques for the average-cost approach and Case Study, Comparable City, and Employee Anticipation techniques for the marginal-cost approach. The choice of an appropriate fiscal-impact-analysis technique depends on the size, growth rate, and service characteristics of the jurisdiction

conducting the analysis, in addition to the nature of the development being analyzed. Marginal-cost approaches are more appropriate for rapid-growth scenarios where existing capacities may be nearing deficiency. Average-cost approaches are particularly useful when the future costs to service development will likely be similar to current service costs.

Chapter 3 outlines fiscal-impact-analysis applications that could be implemented by Delaware's state, county, and municipal governments, offering several recommended first steps that would aid in implementation. Local governments could use fiscal-impact-analysis tools to assess the fiscal impacts of annexation or development proposals and comprehensive plans. The state of Delaware could use fiscal-impact-analysis tools to assess the impacts of comprehensive plans and development proposals, build spatial awareness of state spending, infrastructure, and services, and assess the fiscal impacts of statewide development patterns. The following five recommendations were provided as options for advancing the practice of fiscal impact analysis in Delaware:

1. Develop demographic and service multipliers specific to Delaware.
2. Develop revenue-projection methods that use plans as inputs.
3. Track development data.
4. Build spatial awareness of state spending, infrastructure, and services.
5. Use major state expenditures as fiscal-impact analysis test cases.

## **Chapter 1. Fiscal Impacts of Growth and Development**

This Chapter reviews the literature reporting a connection between growth and development and government revenues and expenditures. For these studies, “Fiscal-Impact Analysis,” a technique used to project the revenue and expenditure implications of growth and development, serves as the underpinning for cost and revenue estimates resulting from development. Section 1-1 examines a representative sample of relevant literature and draws broad conclusions about the fiscal impacts of development. Section 1-2 specifically examines the case of development in Delaware with an eye toward understanding the fiscal impacts of growth on Delaware’s governments.

### ***1-1. A Review of Fiscal-Impact Literature***

This section reviews and summarizes findings from studies examining the fiscal impacts of different development types. In most cases these studies compare the fiscal impacts of trend development patterns (e.g., sprawl development) with those of more compact development patterns (e.g., smart growth or planned development). The studies examine a range from local cost analyses to regional and even national studies. A portion of the literature focuses on only one aspect of development’s impacts, while others present a more holistic review. These studies speak to the fiscal impacts of development by addressing the following questions:

1. Why does growth result in fiscal impacts?
2. What infrastructure and services does growth impact?

### **Why does growth result in fiscal impacts?**

Growth and development traditionally result in population increases and corresponding increases in demand for services and infrastructure. However, the relationship between development and infrastructure demand is seldom as simple as the need for one more unit of infrastructure for every new household. How, where, and when development takes place can have a major impact on the magnitude of fiscal impacts experienced by governments. In particular, the location, density, and design of development play a large role in determining growth’s fiscal impacts.

#### ***Location***

Where development takes place has a significant impact on the resulting fiscal outcomes. Nationwide, contemporary development tends to take place on farmland or greenfields, farther from established cities and towns than in previous eras. Developments often skip over one another in leapfrog fashion, leaving undeveloped space between them. This pattern of development causes fiscal stress since it takes place outside the service area of current infrastructure and service-providers, often necessitating new infrastructure construction and service expansions. New infrastructure includes pipelines to carry sewer and water, electrical lines, social service centers, and roads, all of which must be constructed and maintained. New

services might take the form of expanded police patrol areas, larger or new fire and emergency medical service (EMS) districts, or new public transportation routes.

Due to the ability to use pre-existing services and infrastructure, development in close proximity to areas with existing infrastructure and services tends to be more fiscally beneficial than development taking place in a more far-flung fashion. For example, per-pupil transportation costs have been kept relatively low in Minnesota's Buffalo School District. In this case, the county has adopted a policy encouraging residential development in and near community centers and cities. These locations allow for more students to walk to school, resulting in reduced transportation costs (Duncan 35).

### ***Density***

The density of new development is another fiscal-impact factor. Newer, suburban-style development typically comprises single-family, detached housing on approximately ¼-acre lots. Compact development, built at higher densities, allows more people to live in an area—reducing the total amount of infrastructure needed and ultimately dropping per-capita infrastructure expenditures. For example, if higher-density redevelopment occurs where infrastructure is already in place, there will be more people-per-foot of pre-existing sewer pipeline, resulting in more efficient operations. Higher-density development, regardless of its location, results in the need for less new infrastructure construction since fewer pipes and lane-miles will be needed to connect a relatively large number of households.

### ***Design***

Development's fiscal impact is also influenced by its design. Development patterns predominant since the 1950s have been characterized by a separation of uses and communities, as opposed to a mix of uses and interconnectivity. Mixed uses and interconnectivity are elements of design that can reduce costs for governments and residents. Well-designed developments allow for infrastructure—including water, sewer, and roadways—to be efficiently planned. Unlike cul-de-sac and keyhole developments that limit opportunities for mobility, developments built with interconnections between communities can reduce EMS, fire, and police response times, creating a safer community while cutting transportation costs.

Compact, planned communities provide residents with easy access to needed services such as stores, parks, schools, government facilities, religious institutions, and work—reducing the need for people to use their cars. By designing a walkable and bikeable community with narrower streets and more sidewalks, children are able to walk to school rather than take buses, and residents are given more opportunities to be active and, in turn, healthier. Arlington, Va., provides a great example of a well-designed, walkable community that includes mixed-use development within walking distance of transit centers. The city has provided residents the opportunity to forego automobile use—lessening congestion and wear on roads—while also encouraging higher-density growth where infrastructure is already present.

## What infrastructure and services does growth impact?

The impact of growth and development on the following types of infrastructure and services will be demonstrated throughout this section:

- *Capital Infrastructure*—the cost to construct new capital items
- *Operating Infrastructure*—the cost to operate and maintain capital items
- *On Demand Operating Costs*—the cost to operate services that involve travel and response times

The non-fiscal costs of development are also briefly discussed at the end of this section.

### *Capital Infrastructure*

Two factors generally influence the need for new capital infrastructure to service new development. First, development in an area may outstrip the ability of existing infrastructure to service it, resulting in a need for upgrades and new construction. Second, the density and design of a development may impact the construction costs of new infrastructure. Higher-density development may result in the need for fewer sewer and water laterals. Narrower streets may reduce up-front road construction costs while reducing maintenance costs and improving neighborhood safety. The remainder of this section provides an overview of studies examining the fiscal impact of development on a variety of capital-infrastructure items.

### **Water and Sewer**

Several studies examine the fiscal impacts of development as they relate to water and sewer infrastructure. A 2000 study in New Jersey detailed the statewide implications of so called “TREND” (i.e., sprawl) and “PLAN” (i.e., compact growth) development scenarios and projected \$25 million in savings on water infrastructure (i.e., laterals) between 2000 and 2020 under the PLAN scenario (Burchell, “The Costs and Benefits” 17). A study in Houston, Tex., found a savings of \$2.5 million (21%) on water infrastructure when comparing planned growth to conventional growth (Peiser 427), while another study projected that high-density development resulted in water infrastructure savings of 35 percent over conventional, low-density development (Burchell, “The Cost of Sprawl: 2000” 5).

Another large capital investment is sewer infrastructure. When viewed at the state level, the PLAN scenario in New Jersey was projected to result in \$171 million in sewer infrastructure (i.e., laterals) savings and \$1.26 billion (17%) in full sewer cost savings (including treatment and distribution infrastructure) over the TREND scenario between 2000 and 2020 (Burchell, “The Costs and Benefits” 17). Two local studies examined sewer costs with one estimating a 9 percent savings under the planned scenario and the other estimating a savings of 29 percent (Peiser 427; Center for Energy and Environment 24). Nationally, planned development was projected to result in savings of \$12.6 billion (6.6%) for water and sewer infrastructure costs incurred between 2000 and 2025 (Burchell, “The Cost of Sprawl: 2000” 10).

In Delaware, the counties, municipalities, and private infrastructure providers are responsible for ongoing maintenance, operation, treatment, and distribution facility costs associated with water and sewer. Developers often install sewer and water pipes. The state is also involved in water and sewer infrastructure funding through the Twenty-First Century Fund—providing just over \$40 million in funding for these projects between FY 2002-08 (Delaware Office of Management and Budget 16). The research presented in this section suggests that entities involved in the funding of water and sewer infrastructure can reap fiscal benefits from the pursuit of compact development over more sprawling development patterns.

### **Roads**

Roads are one of the most significant infrastructure expenditures associated with development. While there are some privately constructed and maintained roads, in the vast majority of cases some level of government is responsible for the maintenance of roads. Like other forms of infrastructure, road construction costs can be influenced by the location, density, and design of development. Better-designed, more densely-populated developments can make better use of existing road infrastructure, while development in locations with little existing road capacity can result in the need for major capital outlays associated with new road construction.

A nationally focused study estimated a road infrastructure savings of \$109.7 billion (11.8%) between 2000 and 2025 if a planned development pattern took place (Burchell, “The Cost of Sprawl: 2000” 10). Another national report took the average of three fiscal-impact studies to estimate average road infrastructure savings of 25 percent with planned development (Burchell, “The Cost of Sprawl Revisited” 49). Similarly, New Jersey’s PLAN development scenario was estimated to save approximately \$870 million statewide on road infrastructure between 2000 and 2020 (Burchell, “The Costs and Benefits” 15). The study of Houston found that road infrastructure costs would actually increase with planned development. This was the case because developers were only required to build roads to connect their developments with main roads and not with other developments, leading to a decrease in the total lane-miles constructed compared to a more planned and interconnected development (Pieser 427). That said, in general, if planned and higher-density development is taking place where roads already exist, the initial capital cost for building roads is likely to be reduced since existing capacity can be used.

### **Schools**

Many studies of the relationship between development and school infrastructure report that, regardless of the development pattern chosen, there is little or no difference in the expense of school infrastructure. This finding is largely based on the idea that the pattern of development would not change the ultimate number of children who reside in an area. However, there is some evidence suggesting that—particularly in situations where available regional school capacity is not evenly distributed—the location of development and relocation of households can have a major fiscal impact on school construction costs. A study in Maine noted that \$727 million had been invested in the construction of new schools and additions between 1975 and 1995, despite an overall decrease in the population of school-aged children. As families moved to suburban locations, new schools were built to serve the shifting population while existing schools were left with dwindling populations and excess capacities (Beck 31). School districts in Delaware are

experiencing a similar phenomenon. Rapid growth is generally not occurring where school capacity has historically been located, creating the need to construct new schools in suburban areas while capacity exists in other schools. Between FY 2002 and 2007, enrollment in public schools (including charters) increased by 6.2 percent, while the money spent on new construction and land acquisition increased from approximately \$26.8 million to \$65.3 million over the same time period (Delaware Office of Management and Budget 14).

### ***Operating Infrastructure***

The costs associated with infrastructure construction are certainly a large investment, but they do not reflect the life-cycle costs of infrastructure. The long-term maintenance and operation of infrastructure is often overlooked when calculating the cost of new development. However, in the long run, this is the area that often costs governments and taxpayers the most. For example, a study by the Natural Resources Defense Council (NRDC) found that “average annual [operations and maintenance] costs are about three times greater than annualized capital costs [for water and wastewater systems]” (“Another Cost of Sprawl” 17). The distinction is important because different public and private entities may take on the responsibility for funding a particular portion of infrastructure’s costs over its life cycle. The remainder of this section briefly reviews a set of studies examining the cost of operating and maintaining infrastructure.

### **Sewer**

NRDC studied the effects of land use on wastewater-utility costs in four states and found that low-density developments had substantially higher operating costs than did higher-density developments (“Another Cost of Sprawl” 1). Another study found that an increase in lot size and the subsequent increase in linear distance between houses led to an average wastewater-utility operating-cost increase of 30 percent. Increasing the distance of development from existing service centers also led to an average cost increase of 30 percent. For example, a high-density development 1/4 mile from an existing service center resulted in costs of \$204 to serve the average household, while a sprawling development set five miles from an existing service center costs \$597 per household, per year (Speir 64).

### **Roads**

The Minnesota Department of Agriculture looked at the cost of maintaining roads and found that the average per-capita cost of road maintenance in cities is \$58 while in townships the cost is \$47. The study estimates that when township population exceeds 3,000, the per-capita costs jump to \$70. The higher population density of cities keeps road costs level, regardless of population increases. This suggests that rural roads initially cost less to maintain but, as population increases, maintenance costs on these roads increase dramatically in order to safely carry increased traffic on roads not initially designed for such traffic flows (Duncan Associates).

### ***On-Demand Operating Costs***

Sprawling development patterns tend to place significant distance between residential neighborhoods and community and commercial centers. Increased distances means it takes more time and money for residents and service-providers to get from point A to point B. More gas is

consumed, and more roads need to be built. These factors result in increased fiscal costs, in addition to less tangible costs such as wasted time, increased stress, and public safety hazards.

### **Public Safety**

Large housing lots, streets configured in a curvilinear manner, and leap-frog developments tend to increase trip distance and travel time. This increase in travel time and lack of interconnectivity is especially concerning when it is applied to emergency services such as fire, police, and EMS. According to a study focused on the Chicago metropolitan area, sprawling suburban areas had response times of 9.6 minutes, 15 minutes, and 25.3 minutes for EMS, fire, or police calls, respectively. The response time dropped to 6.2 minutes for EMS calls, 5.2 minutes for fire calls, and 7.6 minutes for police calls in compact developments (Esseks 43-50).

### **School Transportation**

Building new schools in one area while there is excess capacity in another area may be fiscally redundant. The cost of operating a school, once it is built, changes minimally based on its location. The real change in cost has to do with transporting students to and from school campuses. A study of the Chicago Metro Area compared the costs of school bus transportation and found the annual cost for busing in low-density, rural suburbs was between \$278 and \$405 per student. In the higher-density townships, the annual cost dropped to between \$44 and \$155 per student (Esseks 22). The study also noted a difference in the round-trip travel time of the buses. The bus trips in sprawling developments averaged between 37.4 and 50.9 minutes round-trip, while the higher-density developments averaged between 21.1 and 29.3 minutes round-trip (Esseks 37). A study in Minnesota examined the operating costs of 200 schools, finding that the non-transportation costs of schools are minimally affected by location but found that transportation costs were highly dependent on location. School districts in low-density areas spent an average of \$394 on school transportation costs per pupil. Higher-density school districts spent closer to an average of \$310 per student (Duncan Associates 13).

In Delaware, the public school transportation costs for FY2001 were \$439 per student. That number jumped to \$643 per student by FY2007. During that time, total enrollment increased by only 7.2 percent (approximately 8,000 new students), while transportation costs increased by 56.9 percent (Delaware Office of Management and Budget 14). Though some of this increase may be due to increases in fuel cost and other expenses, the drastic increase in the cost of school transportation should be of concern to the state and is suggestive of growth occurring in relatively low-density locations that need to be served by school bus transportation.

### ***Non-Fiscal Costs***

Development also results in many non-fiscal, but still noteworthy, costs. Farmland and open space is being consumed at alarming rates by traditional development practices, destroying natural habitats and threatening the existence of certain species. In Delaware alone, at least 50,000 acres of farmland were lost between 1997 and 2002. Nationwide, there was a net loss of 16,473,446 acres of farmland during that same period (2002 Census of Agriculture). This development creates large areas of impervious surfaces in the form of pavement, rooftops, and covered land that inhibit the ability of water recharge areas to do their job and can result in

damaging floods and run-off from lawns and roads (Maurer 4-5). Sprawling development also puts restraints on farming, as new residential inhabitants complain about the noises, smells, and other characteristics of agricultural land uses. These complaints, as well as run off, trespassing, and frightened livestock, can lead to less productive and viable farms (Esseks 4). Compact growth patterns can facilitate the preservation of open spaces and farmland and improve air quality by reducing per-household vehicle emissions by 20 to 40 percent (Natural Resources Defense Council, "Paving Paradise" 4).

A region's character can also be impacted by development. Delaware is an attractive place to live for many reasons. Its physical landscape is replete with features ranging from bustling urban environments and small towns to rural, agricultural areas, and pristine wetlands. While these impacts aren't easily quantified, the impact of development on these features is often how individuals first experience the effects of growth.

## ***1-2. Fiscal Impacts of Development in Delaware***

Agreement on how development should take place in Delaware is not easily reached. However, it is more likely to be achieved on two key issues. First, the addition of new development, and ultimately new people, into Delaware results in the need for increased state, county, school district, and municipal government expenditures. Second, the impact of development on government expenditures and revenues varies depending on which level of government is examined. Put simply, Delaware's governments do not all rely on the same set of revenues in equal measure. They do not spend money on the same things, and revenues and expenditures are not equally affected by development.

This section will examine the fiscal impacts of development in Delaware by addressing the following questions:

1. How do revenues and expenditures respond to development?
2. What revenues and expenditures comprise budgets in Delaware?
3. What is noteworthy about fiscal impacts of development in Delaware?

### **How do revenues and expenditures respond to development?**

Growth and development impact nearly all government revenues and expenditures in some way. In most cases, growth and development increase a jurisdiction's population, subsequently driving up the total cost of providing infrastructure and services while providing a bigger base from which to collect revenues. Though population growth tends to result in across-the-board revenue and expenditure increases, not all revenues and expenditures are equally impacted by the development process (i.e., the purchase, improvement, and sale of land).

For illustrative purposes only, Table 1-1 divides common government revenues and functional expenditures into two categories, those which will be felt in the short term and those that will only be fully realized months to years afterward. The first category of revenues and expenditures is *Primary/Immediate Response to the Development Process*. For these revenues, development (and redevelopment) is the primary trigger in creating or augmenting revenue streams. Expenditures in this category, such as many forms of infrastructure, are almost immediately necessary in order to service new development.

The second category of revenues and expenditures has a *Secondary/Delayed Response to the Development Process*. These revenues are not directly tied to the development process, but are likely to increase over time as development leads to population growth. Expenditures in this category are typically not immediately necessary for development. However, as with revenues, expenditures may increase over time as the total population and demand for services grow.

This table is not intended to imply that some expenditures are less impacted by development than others, only that the impact is different in character. For instance, *School Infrastructure* is listed in the *Secondary/Delayed* row, as a new school building may not be constructed until some threshold of development has been reached. Even so, it is, without question, one of the most significant expenditures associated with growth. Consider school transportation and operating costs. As soon as a development is occupied, new students must be provided with transportation to school. Even if a new development results in the addition of only a mile or a few minutes time to a bus route, it is still a new and immediate expense. However, the bulk of the school costs (bond debt service, the hiring of new teachers, etc.) are decidedly delayed.

**Table 1-1. Examples of Government Revenue and Functional Expenditure Responses to Development Process**

Nature of Response to Development	Revenues	Functional Expenditures*
Primary/Immediate	<ul style="list-style-type: none"> <li>– Real Property Tax</li> <li>– Realty Transfer Tax</li> <li>– Impact Fees</li> <li>– Building Permit Fees</li> <li>– Utility User Charges</li> </ul>	<ul style="list-style-type: none"> <li>– Water Infrastructure</li> <li>– Wastewater Infrastructure</li> <li>– School Transportation and Operating Costs</li> <li>– Public Safety Patrol and Response Costs</li> </ul>
Secondary/Delayed	<ul style="list-style-type: none"> <li>– Personal Income/Wage Tax</li> <li>– Sales/Gross Receipts Tax</li> <li>– Corporate Income Tax</li> <li>– Lottery</li> <li>– General Licensing Fees</li> </ul>	<ul style="list-style-type: none"> <li>– Social Service Centers</li> <li>– Courts/Prisons</li> <li>– School Infrastructure</li> <li>– Road Infrastructure</li> </ul>

\*Note: Some of these expenditures could arguably be placed in either category. For instance, in cases of imminent deficient capacity, a new school or upgraded road may accompany the approval/populating of a new development. However, such investments may also come some time after a development is built. Expenditures in the “Primary / Immediate” generally must be provided for (as a matter of public health, safety, and welfare) at the time a development is occupied.

## What revenues and expenditures comprise budgets in Delaware?

Having generally discussed the reaction of common government revenues and expenditures to development, it is worthwhile to examine the types of revenues and expenditures that make up Delaware’s state and local government budgets. Table 1-2 lists the top five general-fund revenue sources for the state of Delaware, Sussex County, and the City of Dover. Delaware’s governments rely on revenue mixes that have very different connections to the development process. The state’s revenues tend to rely more heavily on personal income and corporate activity. Delaware’s local government revenues, as evidenced by data from Sussex County and the City of Dover, exhibit a much closer connection to the development process. Nearly 50 percent of Sussex County’s FY 2008 general-fund revenues were attributable to either the realty transfer tax or the real property tax. Sixty-three percent of Dover’s FY 2008 general-fund revenues came from three sources closely tied to the development process—transfers from enterprise funds (resulting from utility sales), real property tax, and realty transfer tax.

**Table 1-2. Top Five General-Fund Revenue Sources: State of Delaware, Sussex County, City of Dover**

State of Delaware	Sussex County	City of Dover
1. Personal Income Tax (30%)	1. Realty Transfer Tax (32%)	1. Transfer from Enterprise Funds (28%)
2. Franchise Tax/Corporate Fees (21%)	2. Real Property Tax (17%)	2. Real Property Tax (27%)
3. Abandoned Property (11%)	3. Appropriated Surplus (8%)	3. User Fees and Other (12%)
4. Lottery (8%)	4. Federal Grants (8%)	4. Realty Transfer Tax (8%)
5. Other Non-Tax Revenue (7%)	5. State Paramedic Grant (8%)	5. Licenses, Permits, Fines (7%)

Sources: State of Delaware—Policy and Financial Overview: Fiscal Year 2008, Delaware Office of the Governor. Sussex County—Budget Fiscal 2008: A Balanced Approach, Presented May 2007. City of Dover—City of Dover 2008 Annual Operating Budget.

Table 1-3 lists the top five general-fund expenditures for the state of Delaware, Sussex County, and the City of Dover. Delaware’s largest general-fund expenditure, public education, is certainly impacted by growth and development. Sussex County and the City of Dover expend significant portions of their general funds on development-impacted expenditures such as paramedics, capital improvements, police, and sanitation.

**Table 1-3. Top Five General-Fund Expenditures: State of Delaware, Sussex County, City of Dover**

State of Delaware	Sussex County	City of Dover
1. Public Education (34%)	1. Paramedic Program (20%)	1. Police (35%)
2. Health and Social Services (28%)	2. Capital Improvement (15%)	2. Administration (18%)
3. Correction (8%)	3. Grants (12%)	3. Parks and Recreation (8%)
4. Higher Education (7%)	4. Finance and Data Processing (12%)	4. Sanitation (8%)
5. Services for Children, Youth, and Their Families (4%)	5. Libraries (7%)	5. Maintenance (5%)

Sources: State of Delaware—Policy and Financial Overview: Fiscal Year 2008, Delaware Office of the Governor. Sussex County—Budget Fiscal 2008: A Balanced Approach, Presented May 2007. City of Dover—City of Dover 2008 Annual Operating Budget.

## What is noteworthy about fiscal impacts of development in Delaware?

When compared to the revenue and expenditure situations in other states, two general findings about the fiscal impacts of development in Delaware are particularly noteworthy. First, spending on infrastructure and services that one would typically characterize as “local” is, in fact, distributed across all levels of Delaware government, with the state, counties, and municipalities all making significant expenditures on such items. These items tend to be expenditures that are identified as having a *Primary/Immediate* response to development in Table 1-1, suggesting that all levels of government feel at least some initial service impact resulting from development. Second, revenues directly associated with development do not accrue equally to all levels of Delaware government. This may not be particularly unique, but it is noteworthy because each level of government has a significant role in providing for development-driven expenditures, even if its revenue sources are not particularly sensitive to development activity. The remainder of this section briefly details these two general findings.

### ***Spending on local services is distributed across all Delaware governments.***

As evidenced by the expenditure data listed in Table 1-3, Delaware’s governments each have the responsibility of providing at least some services and infrastructure for individual towns or communities. For example, the state of Delaware’s number-one general-fund expenditure is on public education—funding the myriad of schools in dozens of Delaware communities. Sussex County spends a significant portion of its funds on paramedic service and makes substantial regional investments through its program of capital improvements. The City of Dover’s spending illustrates mostly local spending on largely local concerns (police, parks and recreation, and sanitation).

Compared to neighboring states, Delaware allocates a larger proportion of its total expenditures on a handful of items that might be considered local in character. Table 1-4 lists the state share of spending as a proportion of all government spending on highways, parks and recreation, and police protection. The State ranks high in terms of proportion of total spending on highways, parks and recreation, police protection, and total expenditures. Compared to the other states, Delaware ranks 5<sup>th</sup>, 1<sup>st</sup>, 2<sup>nd</sup>, and 7<sup>th</sup> on these items, respectively. These high rankings suggest that Delaware is more responsible for funding local services and infrastructure than most other states.

**Table 1-4. State Share of Spending in Delaware, Neighboring States, and the United States, 2005**

Jurisdiction	State Share of Spending as a Proportion of All Government Spending on Select Items (Rank Among States)			
	Highway Spending	Parks and Recreation Spending	Police Protection Spending	Total Spending
Delaware	81.0% (5)	57.6% (1)	35.3% (2)	78.0% (7)
Maryland	67.3% (19)	9.5% (37)	21.1% (15)	64.9% (29)
New Jersey	62.6% (28)	44.3% (3)	16.8% (27)	63.6% (32)
Pennsylvania	77.2% (10)	17.5% (26)	25.4% (5)	62.6% (36)
U.S. Average	61.2%	14.1%	13.4%	62.0%

Source: Governing: State & Local Sourcebook. Originally compiled from the Annual Survey of Government Finances, 2004-2005, U.S. Census Bureau. Accessed on June 3, 2008, from [sourcebook.governing.com](http://sourcebook.governing.com).

This point is further echoed when the share of revenue sources for Delaware's public schools are compared to neighboring states and the U.S. average. Table 1-5 lists the distribution of public school system revenues by federal, state, and local sources. State sources account for nearly 65 percent of public school revenues, a figure nearly 18 percent higher than the national average and significantly higher than the state share in neighboring states.

**Table 1-5. Distribution of Elementary and Secondary Public School System Revenue by Source for Delaware, Neighboring States, and the United States, 2004-2005**

Jurisdiction	% Local Revenue Sources	% State Revenue Sources	% Federal Revenue Sources
Delaware	27.4	64.8	7.7
Maryland	55.5	37.7	6.8
New Jersey	53.9	41.9	4.2
Pennsylvania	56.2	35.6	8.1
U.S. Average	43.9	47.0	9.1

Source: Financing Public Education in Delaware, Center for Applied Demography and Survey Research, University of Delaware, Summer 2007. Originally compiled from the Annual Survey of Government Finances, 2004-2005, U.S. Census Bureau.

Delaware's 2004 Strategies for State Policies and Spending and the Cabinet Committee on State Planning Issues' January 2008 Report to the Governor and the 144<sup>th</sup> General Assembly discuss additional items on which the state expends significant funds to service growth and development. These include water and wastewater, state service centers, and judicial facilities and services.

### ***Development revenues do not accrue equally to all Delaware governments***

Revenue sources for Delaware's local governments tend to be closely tied to the development process. On the other hand, state revenues are not as closely tied to the development process, relying more heavily on personal income and corporate activity to generate revenues. This characteristic is worth noting, particularly in light of the relatively high proportion of funding that the state provides for typically local services and infrastructure. The state's interest in development, through its significant expenditures to support growth, makes it imperative that Delaware play some active role in the land-use and development process.

## Chapter 2. Approaches for Analyzing Fiscal Impacts

This chapter takes a closer look at commonly used fiscal-impact-analysis (FIA) methodologies. The two basic FIA techniques are *average-cost* and *marginal-cost* approaches. Average-cost approaches are “simpler and more popular—costs and revenues are calculated based on the average cost per unit times the demand for that unit” (Tischler 8). Marginal-cost approaches “describe the unique characteristics of a jurisdiction’s capital facilities” in estimating the cost-revenue impacts that new development will bring to a jurisdiction (Ibid).

In short, average-costing approaches assign “per-unit” costs to new development, while marginal-costing approaches assign “next-unit” costs to new development. Average-costing approaches “assume future costs are extensions of current averages,” while marginal-costing approaches provide a greater accounting for local infrastructure and service capacities—recognizing that short-run service and infrastructure discontinuities may greatly influence the cost required by a jurisdiction to service the “next-unit” of development (Burchell, “The Fiscal Impact Handbook” 4). In the long run, the “two techniques will yield similar estimates of growth impact” (Ibid). However, due to the assumptions underlying each method, different results are estimated, particularly in the short term (Edwards). For instance, development that necessitates the building of a new police station in year two of an analysis would result in a much larger estimated cost through a marginal-costing approach than it would through an average-costing approach.

The remainder of this chapter examines the six basic FIA techniques briefly summarized in Table 2-1, with a focus on the assumptions, data needs, steps, and usefulness of each.

**Table 2-1. Common Fiscal-Impact-Analysis Methods**

Method		Description
Average-cost approaches	Per-Capita-Multiplier	Calculate and assign per-person costs to incoming development
	Service Standard	Use manpower/population ratio to calculate costs of incoming development
	Proportional Valuation	Assigns costs to incoming nonresidential development based on development’s proportion of total assessed value
Marginal-cost approaches	Case Study	Projects future service demand and costs based on interviews with municipal department heads
	Comparable City	Projects costs and revenues based on comparison with experience of municipalities of similar size and growth rate
	Employee Anticipation	Projects costs of nonresidential facilities by using number of employees as proxy for costs to service facilities

Source: Burchell, “The Fiscal Impact Handbook.”

## **2-1. Average-Cost Approaches**

Average-cost approaches are the most commonly used FIA methods. They tend to be relatively easy to apply, and their dollar-per-unit simplicity eases explanation of the approaches' findings to public officials and residents (Kotval 4). The remainder of this section provides an overview of the three major average-cost methods—the Per-Capita-Multiplier, Service Standard, and Proportional Valuation techniques.

### **Per-Capita-Multiplier Technique**

The Per-Capita-Multiplier technique is the most commonly employed of the average-cost approaches (Tischler 9). The technique generally involves dividing total government costs by total population to arrive at a figure for average per-capita government costs. This per-capita figure can then be multiplied by the development's anticipated population in order to estimate the government costs necessary to service this growth. Government budgets are typically broken down by function, allowing this technique to offer projections of per-capita costs by category, such as police, sewer, or emergency medical services. Assumptions, data needs, steps, and notes on using the Per-Capita-Multiplier technique are briefly listed and discussed in the remainder of this section.

#### ***Per-Capita-Multiplier Technique Assumptions***

The following assumptions guide the use of the Per-Capita-Multiplier technique:

1. Current average operating costs provide (over the long run) the best estimates of future operating costs due to growth.
2. Current local service levels are the most accurate predictors of future service levels.
3. The population contributing to future costs is sufficiently similar to current population composition.
4. The most accurate estimate of future population comes from knowledge of the expected number of residences in an area by housing type and number of bedrooms.
5. Current distribution of municipal service expenditures serves as a primary indicator of future distribution.

(Burchell, "The Fiscal Impact Handbook" 27)

#### ***Per-Capita-Multiplier Technique Data Needs***

The primary data needs for conducting FIA using the Per-Capita-Multiplier technique are government operating budgets, demographic multipliers, and information about government revenues (Ibid 39). Government operating budgets allow an analyst to calculate per-capita government expenditures in total and, provided that the budget is broken down by government

function, for a variety of expenditure categories. Demographic multipliers are figures used to estimate the population characteristics that will accompany new residential development. They are typically presented by housing type and size so that, for example, the average number of total residents and school-age residents living in a single-family, detached home with four bedrooms can be estimated. Demographic multipliers are typically derived from U.S. Census data and refined through periodic local field surveys to verify the accuracy of estimates. As with all other fiscal-impact-analysis methods, information about the source of government revenues is needed so that revenues can be accurately estimated and ultimately compared with expenditures.

***Per-Capita-Multiplier Technique Steps***

Table 2-2 lists and briefly describes the steps of the Per-Capita-Multiplier technique.

**Table 2-2. Per-Capita-Multiplier Technique Steps**

<b>Step</b>	<b>Description</b>
1. Obtain budget, population, and assessment information.	Compile base data on expenditures, population, and real property value for jurisdiction being analyzed.
2. Categorize and sum expenditures by government function.	Group expenditures into broad functional areas (e.g., public safety, public works) and calculate total for each area.
3. Assign share of government expenditures to existing nonresidential uses.	Calculate the share of total real property value attributable to nonresidential uses and subtract this portion from total expenditures—resulting in expenditures attributable to residential uses.
4. Calculate net annual per-capita government expenditures.	Divide the expenditures attributable to residential uses (calculated in step 3) by total population.
5. Calculate anticipated total resident population by housing type.	Based on information about the number and type of housing to be constructed, use demographic multipliers to calculate anticipated new population.
6. Calculate residential and nonresidential induced total expenses.	Multiple the anticipated new population by per-capita government expenditures to calculate induced residential expenses. Use the proportional valuation technique to calculate induced nonresidential expenses, if applicable.
7. Determine total annual public costs by government function.	Assign new costs to government functions defined in step 2, based on the functions share of existing expenditures.
8. Project total annual public revenues.	Estimate new revenue resulting from development.
9. Calculate cost-revenue surplus or deficit.	Subtract total projected costs from total projected revenues.

Source: Burchell, “The Fiscal Impact Handbook” 28-39.

***Notes on Using the Per-Capita-Multiplier Technique***

The Per-Capita-Multiplier technique is best employed in “communities with a relatively established service infrastructure,” where future service costs are likely to be similar to current costs (Ibid 16). The Per-Capita-Multiplier method does not account for the need for new capital facilities or changes in levels of service. Therefore, it is not an ideal tool to use when significant growth is projected that will likely result in the need for significant infrastructure construction or service expansions in an area. However, this technique tends to project similar costs in the long run as marginal-cost approaches—suggesting that the Per-Capita-Multiplier approach is still useful in these growth scenarios if the timing of needed capital and service improvements is not a

desired outcome. This method is “particularly useful because it provides a fast approximation of the costs of new development based on readily available, historical, local data...[and is] relatively inexpensive to apply” (Ibid). The dollar-per-unit nature of this method makes it fairly simple to communicate Per-Capita-Multiplier findings, adding to its utility.

## **Service Standard Technique**

The Service Standard technique “estimates the future costs of development based on the average staffing and capital-facility service levels for municipalities of similar size and geographic location” (Tischler 9). Service ratios, such as two full-time police employees per 1,000 residents, are used in order to project the fiscal impacts of anticipated population increases. With this service ratio, a 5,000-person increase in population would result in the need for ten new police employees. Budget data on average costs per employee can then be used to estimate the police costs necessary to serve this growth. Assumptions, data needs, steps, and notes on using the Service Standard technique are briefly listed and discussed in the remainder of this section.

### ***Service Standard Technique Assumptions***

The following assumptions guide the use of the Service Standard technique:

1. Over the long run, average existing manpower and capital-facility levels of comparable cities can be used to assign costs to future development.
2. Manpower and capital-facility levels vary according to a community’s population.
3. Geographic location within the United States also affects manpower and capital-facility levels.
4. Average manpower and capital-facility levels in place at the time of development should be used to assign service loads and, ultimately, costs to a new development.

(Burchell, “The Fiscal Impact Handbook” 70)

### ***Service Standard Technique Data Needs***

The primary data needs for conducting a FIA using the Service Standard technique are demographic multipliers, public-employee service standards by government function, average employee costs, capital-to-operating-expenditure ratios by government function, and information about government revenues (Ibid 92). Information on employee service standards and capital-to-operating-expenditure ratios are typically obtained from the U.S. Census of Governments conducted every five years. Average employee costs can be obtained from the local government’s operating budget.

### ***Service Standard Technique Steps***

Table 2-3 lists and briefly describes the Service Standard technique's steps.

**Table 2-3. Service Standard Technique Steps**

<b>Step</b>	<b>Description</b>
1. Determine the new population resulting from development.	Use demographic multipliers to calculate new population resulting from development.
2. Project the number of new public employees necessary to service development.	Use service ratios from the U.S. Census of Governments to calculate number of government employees needed (by function) to service population from new development.
3. Calculate average per-employee operating expenses.	Calculate average employee operating expenses for each government function by summing salary and material expenses.
4. Project total annual operating and capital costs.	Multiply number of new employees by average per-employee operating expenses.
5. Project total annual public revenues.	Estimate new revenue resulting from development.
6. Calculate cost-revenue surplus or deficit.	Subtract total projected costs from total projected revenues.

Source: Burchell, "The Fiscal Impact Handbook" 71-90

### ***Notes on Using the Service Standard Technique***

The Service Standard technique is "typically employed when moderately growing suburbs or cities contemplate a population increment and would like a detailed estimate by service category of the manpower, equipment and capital-facility requirements of such a population change" (Ibid 18). It is frequently used for annexation analyses and has also been used to assess the long-range fiscal implications of state or county "horizon plans" and to estimate future educational service costs (Ibid 19). The data tabulated from the U.S. Census of Governments on average service manpower per 1,000 persons reflect economies of scale achieved when jurisdictions reach a certain size, offering a level of sensitivity not afforded by a strict Per-Capita-Multiplier approach. Additionally, these data can be used to evaluate responses given by key officials and analysts in the Case Study technique—providing examples of actual service responses to growth.

### **Proportional Valuation Technique**

The Proportional Valuation technique is "used solely for evaluating the fiscal impacts of nonresidential growth" (Tischler 9). The technique generally works by assigning a proportion of government service and infrastructure costs to nonresidential (commercial and industrial) land uses based on the relative real property values of residential and nonresidential uses in the jurisdiction. For example, in a jurisdiction with a total real property value of \$100 million and a nonresidential real property value of \$10 million, ten percent of government costs would be assigned to nonresidential uses. Based on the anticipated property value of a new nonresidential development, government costs are assigned to this development based on the ratio of total nonresidential property value to total property value and the ratio of the subject nonresidential property's value to the average value of nonresidential properties. Assumptions, data needs, steps, and notes on using the Proportional Valuation technique are briefly listed and discussed in the remainder of this section.

**Proportional Valuation Technique Assumptions**

The following assumptions guide the use of the proportional valuation technique:

1. Change in property value functions as a substitute for change in land-use intensity, and government costs increase proportionally with the intensity of land use.
2. The direct proportional relationship between nonresidential property value and service costs must be accurately defined to avoid overstating or understating the cost of serving nonresidential development.
3. The service and infrastructure impacts of commercial and industrial land uses are sufficiently similar that they can be grouped in a single nonresidential category.
4. Nonresidential development does not have a major impact on school district services but does create demand for other government services.

(Burchell, “The Fiscal Impact Handbook” 121)

**Proportional Valuation Technique Data Needs**

The primary data needs for conducting FIA using the Proportional Valuation technique are information about government revenues and property values by parcel and land use (Ibid 130). The property-value data are needed to calculate the ratio of nonresidential property value to total property value. Parcel data are necessary so that average property values by land use can be calculated, allowing for costs associated with new nonresidential development to be more accurately calculated.

**Proportional Valuation Technique Steps**

Table 2-4 lists and briefly describes the Proportional Valuation technique’s steps.

**Table 2-4. Proportional Valuation Technique Steps**

Step	Description
1. Assemble and prepare base-expenditure, property value, and parcel data.	Acquire data on property value by parcel, budget data, and land use (residential vs. nonresidential).
2. Assign a share of existing government expenditures to nonresidential uses.	Calculate the share of total real property value attributable to nonresidential uses, choose refinement coefficient, and estimate share of total expenditures attributable to nonresidential uses.
3. Project the future government operating costs induced by nonresidential development.	Based on the new facility’s share of total nonresidential value, assign operating costs to new facility.
4. Assign nonresidential development costs to government service categories.	Conduct case studies of impact of nonresidential uses to assign costs to specific expenditure categories.
5. Project total annual public revenues.	Estimate new revenue resulting from development.
6. Calculate cost-revenue surplus or deficit.	Subtract total projected costs from total projected revenues.

Source: Burchell, “The Fiscal Impact Handbook” 121-127

### ***Notes on Using the Proportional Valuation Technique***

The Proportional Valuation technique “provides an extremely fast and inexpensive gauge of the fiscal impact of nonresidential facilities” (Ibid 20). It is most appropriately used in areas where current costs can serve as reasonable approximations of future costs. It is least appropriate for situations where a large nonresidential facility may overwhelm the capabilities of a relatively unsophisticated system of services and infrastructure (Ibid). The Proportional Valuation technique is often used in tandem with other FIA methods to estimate nonresidential impacts they cannot assess. While this technique is quick and easy to complete, its relatively simplistic method of applying costs to nonresidential facilities—based on the share of total real property value that these facilities represent—can, if local conditions are not carefully considered, easily over- or under-estimate the costs associated with nonresidential facilities.

## ***2-2. Marginal-Cost Approaches***

While marginal-cost approaches are not as commonly used as average-cost approaches, they take into account such local factors as population growth rates and infrastructure and service capacities. Marginal-cost approaches generally rely on locally provided data on probable service responses to growth or data on expenditure characteristics for similarly situated governments to estimate the fiscal impacts of development (Kotval 9). The remainder of this section provides an overview of the three major marginal-cost methods—the Case Study, Comparable City, and Employee Anticipation techniques.

### ***Case Study Technique***

The Case Study technique can yield rich detail about the local infrastructure and service implications of development, but is perhaps the most time-consuming of the FIA methods (Tischler 9-10). The technique requires interviews with those responsible for providing infrastructure and services to accurately assess existing capacity and determine the most likely government responses (in terms of service and infrastructure expansion) to given magnitudes of development. Despite the time requirements necessary for properly conducting a Case Study analysis, the technique remains popular, since it uses local data on capacities to project when significant capital expenditures and service expansions will be needed to support growth. Assumptions, data needs, steps, and notes on using the Case Study technique are briefly listed and discussed in the remainder of this section.

### ***Case Study Technique Assumptions***

The following assumptions guide the use of the Case Study technique:

1. Communities differ in their level of service and infrastructure capacity.
2. Marginal changes in providing government services or infrastructure, in reaction to excess or deficient capacity, are the most accurate indication of future costs.

3. Local service levels are the criteria by which excess and deficient capacities are calculated.
4. Department and agency heads intimately familiar with service-delivery capacities provide the most accurate gauge of future expenditures for particular services or infrastructure.

(Burchell, "The Fiscal Impact Handbook" 47-48)

### ***Case Study Technique Data Needs***

The primary data needs for conducting FIA using the Case Study technique are demographic multipliers of population by housing type, estimates of local service and infrastructure capacities, and information on government revenue (Ibid 60). Capacity estimates are best gathered through interviews with agency and department officials responsible for providing specific services and infrastructure. These officials must also be consulted in order to determine the most likely government response to increased demand for services or infrastructure resulting from a certain magnitude of development.

### ***Case Study Technique Steps***

Table 2-5 lists and briefly describes the Case Study technique's steps.

**Table 2-5. Case Study Technique Steps**

<b>Step</b>	<b>Description</b>
1. Talk to key officials/analysts.	Interview key officials to begin process of identifying capacities and likely service responses.
2. Categorize public service functions.	Organize public functions by broad category (e.g., public safety, public works, health and welfare).
3. Determine service and infrastructure capacities.	Interview key officials to determine whether excess or deficient service and infrastructure capacities exist.
4. Project population increases and induced service and infrastructure demands.	Use demographic multipliers to project population increase due to development and arrive at induced service-demand figures through official interviews and general service-ratio data.
5. Determine anticipated service response.	Interview officials to determine most likely service and infrastructure response to population growth, in terms of new manpower and capital facilities.
6. Project total annual public costs.	Convert new manpower and capital facilities (from step 5) to public expenditures.
7. Project total annual public revenue.	Estimate new revenue resulting from development.
8. Calculate cost-revenue surplus or deficit.	Subtract total projected costs from total projected revenues.

Source: Burchell, "The Fiscal Impact Handbook" 49-59

### ***Notes on Using the Case Study Technique***

As opposed to average-cost approaches, the Case Study technique is most appropriately used when current service costs are not the best indicator of future costs. This often happens when there is an excess or shortage of service capacity. In either case, the next unit of development would be particularly expensive or inexpensive to serve. This technique operates under the assumption that a "tipping point [is] reached because of [a] specific development increment and

a local decision is made to build a new [facility]...[reflecting] the real world of municipal decision making” (Ibid 18). It is a particularly useful technique for situations of rapid growth in which service demand may soon outstrip operating capabilities and is often used to study the impacts of one major residential or nonresidential project. The Case Study technique has two main values. It describes the impacts of growth in nearly line-item detail, while identifying when major operating and capital expenditures will be needed. Its findings are easy to communicate, since it deals with familiar concepts, such as the need to build a new school or wastewater plant. On the other hand, the Case Study technique can be time- and resource-intensive, and it is reliant on accurate portrayals of existing capacities and likely service responses from key officials.

## **Comparable City Technique**

The Comparable City technique projects the fiscal impacts of future development by applying average expenditure figures to a jurisdiction, based on the experience of cities with similar populations and growth rates (Tischler 10). As with the Service Standard technique, this method uses data from the U.S. Census of Governments to calculate average government expenditures. Assumptions, data needs, steps, and notes on using the Comparable City technique are briefly listed and discussed in the remainder of this section.

### ***Comparable City Technique Assumptions***

The following basic assumptions guide the use of the Comparable Cities technique:

1. Public service expenditures vary significantly according to a community’s size and growth rate.
2. Government-expenditure patterns after growth are the best indication of future expenditures.

(Ibid 100)

### ***Comparable City Technique Data Needs***

The primary data needs for conducting FIA using the Comparable City technique are demographic multipliers of population by housing type, information about local revenues, and expenditure data for cities of various population sizes and growth rates (Ibid 114). Expenditure data can be compiled from the U.S. Census of Governments conducted every five years.

## Comparable City Technique Steps

Table 2-6 lists and briefly describes the Comparable City technique's steps.

**Table 2-6. Comparable City Technique Steps**

Step	Description
1. Determine population growth.	Use demographic multipliers to project population increase due to development.
2. Select appropriate expenditure multipliers and calculate rate-of-multiplier change.	Based on U.S. Census of Governments data on expenditures for cities of certain population sizes and growth rates, categorize the jurisdiction in question, assign a pre- and post-growth expenditure multiplier, and calculate a rate-of-multiplier change to equal post-growth divided by pre-growth multiplier.
3. Calculate current expenditures per capita.	Group existing budget into government functions, calculate expenditures by function, and divide by total population.
4. Calculate future expenditures per capita.	Multiply the rate-of-multiplier change by current expenditures per capita.
5. Determine costs attributable to growth.	Multiply future expenditure per capita by total future population. Subtract current costs to calculate costs attributable to growth increment.
6. Project public revenue attributable to project.	Estimate new revenue resulting from development.
7. Calculate cost-revenue surplus or deficit.	Subtract total projected costs from total projected revenues.

Source: Burchell, "The Fiscal Impact Handbook" 100-114

### Notes on Using the Comparable City Technique

The Comparable City technique is best employed when "there is believed excess or deficient service system capacity and it is felt that the experience of other comparably sized and similarly growing communities would be of assistance in providing insight to this system capacity as it relates to the impact projection" (Ibid 19). Its chief value is that it recognizes the economies of scale inherent in the expenditure patterns of communities of various sizes. This technique relies upon municipal expenditure data from the U.S. Census of Governments. The Census of Governments data can provide a framework for evaluating interviews with key officials conducted for the Case Study technique, particularly providing a framework from which to view officials' indications of likely service responses to development.

### Employee Anticipation Technique

The Employee Anticipation technique projects the fiscal impact of nonresidential development and assumes that "each new job in [a jurisdiction] will impact expenditures for basic services by a certain percent" (Tischler 10). As with the Proportional Valuation technique, total expenditures are assigned to nonresidential uses based on the proportion of total real property value that these uses comprise. This method relies on "multivariate regression analysis to predict the change in [government] expenditures related to local employment variation" (Burchell, "The Fiscal Impact Handbook" 135). Assumptions, data needs, steps, and notes on using the Employee Anticipation technique are briefly listed and discussed in the remainder of this section.

**Employee Anticipation Technique Assumptions**

The following assumptions guide the use of the Employee Anticipation technique:

1. The magnitude of local government expenditures is directly affected by the level of local commercial or industrial employment.
2. The impact of additional employment will vary for communities of differing population size and direction of growth.

(Ibid 136)

**Employee Anticipation Technique Data Needs**

The primary data needs for conducting FIA using the Employee Anticipation technique are per-capita government expenditures by function, statistically generated coefficients of per-capita percent expenditure change per new employee, projections of employees attributable to new nonresidential development, and information about local revenues (Ibid 143). While coefficients of per-capita percent expenditure change per new employee were provided by Robert Burchell’s 1978 book The Fiscal Impact Handbook, the present unavailability of this data would necessitate a new regression analysis to calculate these figures. Employment projections could rely on developer estimates or a source such as the Urban Land Institute’s Dollar’s and Cents of Shopping Centers to estimate employment based on employee-per-square-foot averages.

**Employee Anticipation Technique Steps**

Table 2-7 lists and briefly describes the Employee Anticipation technique’s steps.

**Table 2-7. Employee Anticipation Technique Steps**

Step	Description
1. Determine per-capita government expenditures by service category.	Group expenditures into broad functional areas (e.g., public safety, public works), calculate total for each area, and divide by total population to calculate per -apita expenditures
2. Estimate anticipated employment for the new nonresidential facility.	Use an industry reporting guide (e.g., <u>Dollars and Cents of Shopping Centers</u> ) to calculate estimated employment for a new nonresidential facility.
3. Choose the applicable percentage increase per employee, by service category, in per-capita local government costs.	Use U.S. Census of Local Governments data to classify study jurisdiction into category based on size and growth rate, then select applicable percentage increase of government costs for each additional employee.
4. Calculate total percentage increase for each service category based on new employment.	Multiply anticipated new employment by figures from step 3, for each government service category.
5. Calculate the per-capita dollar increase for each service category.	Multiply percentage increase for each government service category by existing expenditures for that category.
6. Calculate cost increase for each service assignable to the nonresidential facility.	Multiply the dollar-per-capita expenditure increase in each service category by the existing population.
7. Project total annual public revenues.	Estimate new revenue resulting from development.
8. Calculate cost-revenue surplus or deficit.	Subtract total projected costs from total projected revenues.

Source: Burchell, “The Fiscal Impact Handbook” 137-143

### ***Notes on Using the Employee Anticipation Technique***

The Employee Anticipation technique estimates the impacts of nonresidential facilities by applying costs to new development, based on the total number of local employees generated. It operates under the same general assumption as the Proportional Valuation method—that the cost to service nonresidential uses is similar to the proportion of total real property value those uses comprise. This approach is “rarely used” and requires sometimes difficult data steps, such as estimating “future employment by industry type” (Tischler 10).

## **2-3. Analysis of Fiscal-Impact Analysis Techniques**

This section discusses three general concepts related to FIA techniques. First, the general risks of using FIA techniques are reviewed. Next, some of the common data needs for FIA methods are identified. Finally, the concept of choosing or creating the appropriate FIA technique is discussed.

### **General Risks of Using Fiscal Impact Analysis Techniques**

There are three general risks associated with the use of FIA. First, as with almost any analysis, there is the possibility for a “garbage in, garbage out” situation (Tischler 8). If assumptions are fundamentally flawed, or otherwise inaccurate, projections resulting from a FIA will also be fundamentally flawed or inaccurate. The “political effects of making data assumptions explicit” are another risk associated with the use of this technique (Ibid). This can be particularly risky when there is a question surrounding just what the adequate and appropriate level of service is in a community. If residents want a higher level of service than is currently being offered, fiscal-impact studies performed with the assumption of maintaining existing service levels could prove to be controversial. The third risk associated with the use of FIA is that it may unfairly neglect other impacts (Ibid). For example, FIA may project that a development will not be beneficial to a municipality from a cost-revenue perspective. However, the development may provide benefits to the community that are of equal importance to any cost-revenue considerations, such as the provision of affordable housing. Considerable caution should be exercised when using FIA findings in the context of the development-review process. Legal precedent suggests that they cannot be the sole justification for denying a development application (Burchell, “The Fiscal Impact Handbook” 239-255).

### **Common Data Needs for Fiscal Impact Analysis Techniques**

FIA techniques commonly require three basic pieces of information. These figures are generally needed regardless of the FIA method chosen, making them critical components of any program promoting the use of FIA techniques. First, some unit of projected development or population growth on which to base FIA. This information is likely to come from either a comprehensive plan or a proposed development plan. It may take the form of a simple population projection, the square footage of proposed nonresidential development, or the proposed number of housing units of a particular size and type.

Next, demographic and service multipliers are necessary components of almost all FIA methods. Demographic multipliers translate proposed housing units of various types and sizes into projected population growth. Service multipliers perform a similar function by projecting the demand for services and infrastructure resulting from an increment of development. National and regional multiplier figures are available, but Delaware-specific multipliers should be created to accurately reflect local household and service characteristics.

Finally, projections of government revenues resulting from development are needed for every FIA technique. Fairly established methods exist for estimating most government revenue sources at the local and regional levels, although their ease of use can vary significantly.

### **Choosing/Creating the Appropriate Fiscal-Impact Analysis Technique**

The accuracy of an FIA technique is dependent upon choosing the right method given the particular circumstances of the development and jurisdiction in question. Some techniques only project impacts for nonresidential facilities. Others may not be readily applicable in rapid growth scenarios. The appropriateness of various fiscal-impact assessment methods can vary based on the size, growth, and service characteristics of the subject jurisdiction.

For municipalities, the choice of an FIA technique should be based upon the jurisdiction's service characteristics and growth rates and the nature of the development being analyzed. In general, marginal-cost approaches are more appropriate when existing service and infrastructure capacities are about to be exceeded. Average-cost approaches function well when reaching such a threshold is not imminent. The Case Study and Per-Capita-Multiplier techniques should satisfy most municipal requirements for FIA. The Case Study method is particularly useful for reviewing major projects or growth plans, while the Per-Capita-Multiplier method may be more useful for reviewing modest, regularly occurring projects, since it can be conducted with relative ease. The Comparable City and Service Standard techniques can be useful for municipalities that want to benchmark their experiences against those of similar jurisdictions.

For more regional governments, such as counties or the state of Delaware, more complex FIA models may be necessary. In many cases, choosing a single approach is not the best solution. Per-Capita-Multiplier techniques may be more appropriate to capture development's impact on some service categories than the Case Study technique is, and vice versa. At the level of a state or county, a mixed-method fiscal-impact model (composed of marginal- and average-cost approaches) seems most appropriate, given the wide variety of service types provided by these governments. From an accuracy perspective, it would be valuable for a county or state government to conduct a Case Study analysis to begin the fiscal-impact model-building process. The Case Study analysis would take the jurisdiction through the process of carefully defining service areas, assessing existing capacities, and determining likely responses to various increments of growth. Once an initial model is created, the ease and functionality of average-cost approaches can be introduced so that impacts can be calculated quickly. Periodically, a Case Study-style review of the model would be necessary to confirm that the per-capita-model assumptions are accurate, making refinements as necessary.

## **Chapter 3. Applying Fiscal-Impact Analysis in Delaware**

Fiscal-impact analysis (FIA) techniques hold great promise for implementation by Delaware's state and local governments. This chapter offers up fiscal-impact analysis applications that may be valuable for Delaware's governments to pursue. Section 3-3 of this chapter lists and describes some key first steps that the Budget Development, Planning and Administration (BDPA) division of the Office of Management and Budget could complete in order to advance the practice of fiscal-impact analysis in Delaware.

### **3-1. Local Government Applications**

FIA tools have been most heavily used by local governments. This is not surprising for two key reasons. First, local governments are typically responsible for making the land-use and development decisions commonly analyzed by such tools. Second, local governments often spend a large portion of their budgets on service and infrastructure items that are significantly impacted by development. Recognizing the potential value of FIA for local governments, this section briefly details the following two applications of these tools that could be pursued by Delaware's local governments:

1. Assess the fiscal impacts of annexation and development proposals.
2. Assess the fiscal impacts of comprehensive plans.

#### **Assess the fiscal impacts of development and annexation proposals.**

The use of FIA techniques is not completely foreign to Delaware's local governments. The City of Dover and the City of Newark have employed these techniques in recent years to focus on the fiscal impacts of development and annexation proposals. In 1989 the City of Newark developed a fiscal-impact model that is used in the review of nearly all developments in the city (Roser). The use of FIA tools to review development proposals often creates the need for a pre-existing model to be in place, since development applications must typically be handled in a timely fashion. The City of Newark's model allows for the quick calculation of fiscal impacts associated with a development. Delaware municipalities could modify Newark's model (or a similar one) to reflect local characteristics, in order to provide a tool that would acknowledge fiscal and service impacts in the development-review process.

In conjunction with the updating of its comprehensive plan, the City of Dover conducted an FIA of its annexation plan in May 2003 (City of Dover, Del. 154). The City retained the services of the Philadelphia-based consulting firm Kise Straw & Kolodner to conduct the analysis. Urban Partners of Philadelphia operated as a consultant to Kise Straw & Kolodner throughout this process. These consultants also prepared a fiscal-impact model, combining characteristics of the Per-Capita-Multiplier and Proportional Valuation techniques, for the city's future use (Mix 32). In addition to this model, the primary output of this analysis was a projection of the costs and revenues associated with the lands identified for potential annexation in the city's plan.

FIAAs focused on development and annexation proposals could prove valuable to Delaware's municipalities. First, the projection of costs and revenues associated with a FIA should help to facilitate the proper planning and phasing of service delivery to keep pace with any boundary extensions and increases in population. They may assist municipalities in dealing with the increased governance responsibilities that often accompany growth and development. Next, FIA can serve as an annexation decision-making tool that recognizes the importance of fiscal impacts to many of Delaware's municipalities. While development decisions made strictly on the grounds of fiscal concerns are not to be encouraged, such analyses can at least serve to acknowledge anticipated fiscal and service impacts in the development process. Finally, FIA can help in providing much of the information necessary for the plan of services that the Delaware Code requires municipalities to prepare for proposed annexation areas.

### **Assess the fiscal impacts of comprehensive plans.**

Another potential local government application of FIA tools is to assess the fiscal impacts of comprehensive plans. Efforts could specifically focus on conducting fiscal-impact assessments of future land-use and development scenarios. Three of the stated benefits of conducting FIA speak to the value that FIAs can bring to the comprehensive-planning process. First, FIA can help to "[clarify] development policy impacts" by introducing actual costs, revenues, and service impacts into conversations about desired future development scenarios" (Tischler 7). Next, FIA can "[encourage] anticipation of change" by providing a "clear sense of the likely effects of various policies" (Ibid 6). A clear picture of likely development impacts can help community residents and officials make more informed decisions about land-use policy. Finally, FIA can "[project] capital-facility needs" (Ibid 7). The addition of capital-facility planning to the comprehensive-planning process is a logical and valuable one, as it can encourage the phasing of improvements as development occurs.

There are several reasons why it may be advantageous for local governments to engage in FIA during the comprehensive-planning process. First, for many of Delaware's smaller municipalities without a professional planning staff, the comprehensive-planning process is one of the few times when the municipality has access to professional planners. For municipalities with professional planners on staff, the comprehensive-planning process may still be one of the few times that detailed, town-wide analyses, such as population projections, are conducted. Second, since annexation plans are required in Delaware comprehensive plans (if the municipality wishes to annex), it seems that this requirement provides an ideal opportunity to investigate the fiscal impacts that may result from annexations. Finally, FIAs can take long periods of time, suggesting that they are most appropriately conducted in the context of the comprehensive-planning process, when communities are already engaged in serious deliberations about future growth and development.

### **3-2. State Government Applications**

FIA tools also hold great potential for use by state governments. This is particularly true when the state plays a significant role in funding and maintaining infrastructure and services that support development, as is the case in Delaware. The state does not have land-use decision-making authority, but it is responsible for dealing with the costs associated with these decisions. A better understanding of development's impacts, brought about through the use of FIA techniques, could allow Delaware to more effectively and efficiently plan for the provision of future services and infrastructure. Recognizing the potential value of FIA for state governments, this section briefly details two potential applications of these tools that Delaware could pursue.

1. Assess the fiscal impacts of comprehensive plans and development proposals.
2. Assess the fiscal impacts of statewide development patterns.

#### **Assess the fiscal impacts of comprehensive plans and development proposals.**

The state can benefit from assessing the fiscal impacts of comprehensive plans for many of the same reasons as local governments. Since Delaware is a provider of infrastructure and services, it can use FIA tools to better understand the likely impacts of development anticipated in comprehensive plans. By understanding the likely impact of development planned for within localities, state agencies can then plan for service and infrastructure expansions necessitated by anticipated growth. Ideally, this work would eventually lead to the consideration of local comprehensive plans when state capital and operating budgets are prepared. Service and infrastructure could then be provided in sync with development.

The case for the state using FIA tools is further bolstered by a requirement of the Delaware Code. According to Title 29, Chapter 91 of the Delaware Code, the state's comprehensive plan review and certification process "shall include an assessment of the potential fiscal impacts of the proposed county or municipal comprehensive plan as they relate to State-funded infrastructure and services, including, but not limited to, transportation, water and sewer systems, public schools, affordable housing, and public safety." The State also reviews larger-scale developments through the Preliminary Land Use Service (PLUS). Not all PLUS projects are ultimately built, but understanding the fiscal impacts of these potential developments can only help state agencies better understand the cumulative impacts growth may have on their capital and operating needs.

## **Assess the fiscal impacts of statewide development patterns.**

The Delaware Strategies for State Policies and Spending (Strategies) document is intended to serve as a guide for state investments. Ideally, this strategic document can guide growth to those areas where the fiscal impacts are relatively minimal, encouraging local governments and private actors to promote growth within the identified areas while discouraging growth in those areas where infrastructure and services will be more costly to provide. The logic underlying the Strategies is similar to the conclusions found throughout much of the research reviewed in this report—the main contentions being that the location, density, and design of new development in Delaware can have a major impact on the future fiscal and non-fiscal costs that the state’s governments and residents will face.

FIA techniques could be used to enhance future versions of the Strategies in two specific ways. First, an explicit assessment of the fiscal impacts of the development pattern called for by the Strategies would lend support to the identified Investment Levels. New Jersey has completed fiscal-impact assessments of its state plan that Delaware could model to analyze the Strategies (Burchell “The Costs and Benefits”). Second, FIA tools could be used to measure the performance of the Strategies. This may involve tracking statewide development, service, and infrastructure trends as inputs to a model that would regularly assess the fiscal impacts of growth. Such a process of regular fiscal progress reports could create a valuable feedback mechanism, allowing for tweaks to the Strategies should development over-stress certain service or infrastructure capacities or if development that occurs, as called for by the Strategies, produces unacceptable fiscal results.

### **3-3. Recommended First Steps**

Many details need to be worked out in order for FIA tools to be implemented by Delaware governments. For instance, methods need to be carefully selected based on the application in question. Robust models will, in some cases, need to be developed. The level of time, effort, and commitment required to implement FIA tools will vary based on the government in question. However, there are several steps that could push forward the use of FIA techniques for all governments in Delaware. BDPA could reasonably serve as the lead agency for work on these items. The remainder of this section focuses on five activities that could serve to advance the practice of FIA in Delaware.

1. Develop demographic and service multipliers specific to Delaware.
2. Develop revenue projection methods that use plans as inputs.
3. Track development data.
4. Build spatial awareness of state spending, infrastructure, and services.
5. Use major state expenditures as fiscal-impact analysis test cases.

## **Develop demographic and service multipliers specific to Delaware.**

Demographic multipliers are a key component of almost all the fiscal-impact assessment techniques examined in this report. They can translate planned development, in the form of the number of housing units of a given size and type, into population projections broken down by age groups. Taken one step further, service multipliers can translate these population projections into likely increases in service and infrastructure demand brought about by a specific development. FIA techniques cannot be conducted without these multipliers, as new population and service demand created by a development are crucial factors in estimating the impact of that development.

BDPA should develop a set of demographic and service multipliers for state and local government use in assessing growth's impacts. These multipliers could be published in a handbook distributed for use by planners and analysts at the state and local government level. The general process to develop demographic multipliers would begin by acquiring Public Use Microdata sample data from the U.S. Census Bureau. Analysis of this data would be used to generate a profile of the average household residing in a variety of housing types and sizes. These draft multipliers could then be refined through examining on-the-ground evidence of household characteristics and changes in demographic trends that have occurred since the 2000 U.S. Census.

Service multipliers allow one to estimate the new service and infrastructure demand for a projected population. These data would come in the form of a given unit of service needed to support a certain population or number of households. For instance, 2.6 police personnel per 1,000 residents or 300 gallons of wastewater capacity per single-family, detached housing unit. There are many sources, such as Arthur Nelson's Planner's Estimating Guide, that could be used as a starting point for developing service multipliers specific to Delaware. National sources on service and infrastructure demand could be supplemented by interviews with local service-providers to arrive at service multipliers appropriate for Delaware.

## **Develop revenue projection methods that use plans as inputs.**

Revenue projections are necessary for all the FIA techniques profiled in this report. Without relatively accurate revenue-forecasting methods in place, FIA techniques will fall short of delivering balanced cost/revenue data. Revenue-projection needs include those that are highly tied to the property-development process, such as real property taxes and realty-transfer taxes, and those that react more generally to increases in population, such as personal income taxes.

BDPA should develop a guidebook for projecting common state and local government revenues, using comprehensive plans and development proposals as inputs. Exact methods of forecasting revenues would likely vary by jurisdiction, but a guidebook laying out general revenue-projection approaches could certainly facilitate the use of FIA techniques in Delaware. Burchell's The Fiscal Impact Handbook and a wealth of other sources could be relied upon to generate Delaware-specific revenue-projection methods.

At a minimum, the following revenue sources would need to be included in a Delaware guide to revenue projections:

- Real Property Tax
- Personal Income Tax
- Realty-Transfer Tax
- Impact Fees
- User Fees for Water, Wastewater, and Solid Waste Services

## **Track development data in Delaware.**

Simply knowing where development is being approved and built in Delaware is a valuable input to the FIA process. These data can be used to refine demographic and service multipliers and to create a Delaware development database that shows the cumulative growth being approved and built. For FIA purposes, these growth figures can be translated into data on the cumulative fiscal impacts of development across Delaware.

BDPA should continue its ongoing efforts to regularly collect data on approved and built development from Delaware's local governments. These data should be compiled in a database that allows for the spatial tracking of development using geographic information systems (GIS). The method for collecting data should be continually refined as BDPA becomes more familiar with the type of information that will be most useful for fiscal-impact analyses.

## **Build spatial awareness of state spending, infrastructure, and services.**

One reason fiscal-impact analyses have traditionally been conducted at the local level may be that service and infrastructure arrangements are more readily understood and quantified on a municipal scale. Municipal water systems serve customers within a specified boundary, and town police likely patrol only within town. However, many state service areas are not so easily defined. For instance, what areas are served by a given state service center or a court facility? What areas are funded by specific state investments in road or wastewater infrastructure? The answers to these types of questions can enable the state to better understand service capacities and the impacts of development on state-provided services and infrastructure.

BDPA should build a "spatially aware" model of state spending, infrastructure, and services. A "spatially aware" model can emphasize that state expenditures are not simply line-items but serve specific geographic areas and are impacted by growth in or near those areas. Such a model would accomplish three things. First, it would track state discretionary spending by municipality, county, and, ideally, by defined service area (i.e., the area directly benefiting from these expenditures). Next, it would define service areas for state-funded facilities (e.g., service centers, courts), services (e.g., state police and EMS), and infrastructure (e.g., water and wastewater). Finally, it would track the existing capacity of these services and infrastructure. Combined with a database that tracks development, this model could identify pending service deficiencies, alerting service-providers and BDPA staff to the need for additional operating and capital expenditures in focused areas. While likely an intensive, time-consuming effort, the

development of such a “spatially aware” budget model would be invaluable to the cause of conducting statewide assessments of development’s fiscal impacts.

### **Use major state expenditures as fiscal-impact analysis test cases.**

Lastly, BDPA should identify major state expenditures, such as education, police service, and state service centers, as FIAs test cases and engage staff in the creation of models to assess the fiscal impacts of development on these expenditures. The approach used would likely combine elements of the Case Study and Per-Capita-Multiplier techniques (as discussed in section 2-3), two of the most commonly employed techniques that offer relative ease of use along with the potential for rich data outputs. The creation of fiscal-impact models for a few major items would serve as an important first step toward the development of a comprehensive model that holistically assesses development’s fiscal impacts on the state.

## Appendix. Annotated Bibliography

2002 Census of Agriculture. Land in Farms - Change in Acreage: 1997 to 2002.  
[www.agcensus.usda.gov/Publications/2002/Ag\\_Atlas\\_Maps/Farms/pdf/02-M077-RGBDot2-largetext.pdf](http://www.agcensus.usda.gov/Publications/2002/Ag_Atlas_Maps/Farms/pdf/02-M077-RGBDot2-largetext.pdf) Accessed June 2008.

This map, created by the U.S. Department of Agriculture's National Agricultural Statistics Service, tracks the change in farmland between 1997 and 2002. Each dot represents 10,000 acres with red being a decrease and blue being an increase. Delaware has no blue dots and five red dots, totaling a 50,000 acre loss in farmland.

American Farmland Trust. Fact Sheet: Cost of Community Services Studies. Washington, D.C.: Farmland Information Center, 2001.

This study was conducted by the American Farmland Trust (AFT), an organization formed in the 1980s to protect and preserve farmland. The report analyzes 15 years of research to determine the dollar cost of community services as a ratio of revenues to expenditures between agricultural or open spaces and residential land. It found residential land has an average cost of \$1.16 for every dollar of revenue it generates in taxes while working/open space costs only \$.36 for every dollar of revenue. The AFT hopes its research will help local officials better understand the full costs of various types of land uses.

Beck, Roy, Leon Kolankiewicz, and Steven A. Camarota. Outsmarting Smart Growth. Washington D.C.: Center for Immigration Studies, 2003.

The authors, Roy Beck (Director for the NumbersUSA Education and Research Foundation), Leon Kolankiewicz (an environmental scientist and natural resources planner), and Steven A. Camarota (Director of Research at the Center for Immigration Studies in Washington, D.C.), worked with the Center for Immigration Studies to complete this report. They believe sprawling development is due, in large part, to population growth and an increase in immigration, in addition to the traditional land-use patterns. They do not believe increasing density alone will solve the problem of sprawl. They used data from the Natural Resources Conservation Service as well as data from their own analysis of the 100 largest urban areas in the nation between 1970 and 1990. They feel that slowing the population growth, mainly from immigrants, would help to counter sprawling development.

Burchell, Robert W., Anthony Downs, and Samuel Seskin. The Cost of Sprawl: 2000. Washington, D.C.: Transit Cooperative Research Program, Transportation Research Board, National Research Council: TCRP Report 74, 2002.

This report was sponsored by the Federal Transit Administration, an organization charged with helping determine the future mobility needs of the nation. The authors of the report are from the Center for Urban Policy Research at Rutgers University, the Brookings Institution, Parsons Brinkerhoff Quade and Douglas, Inc., and ECONorthwest. This

report showcases the results of five years of research to determine the impact sprawl has on resources, its personal costs, and what can be done to deal with sprawling development. In Part C, Section 7, there are cost-analysis graphs for the cost of water and sewer infrastructure. In Part C, Section 8, there is an analysis of the cost of road infrastructure under controlled and uncontrolled development scenarios.

Burchell, Robert W., Anthony Downs, and Samuel Seskin. The Cost of Sprawl: Revisited. Washington, D.C.: Transit Cooperative Research Program, Transportation Research Board, National Research Council: TCRP Report 39, 1998.

The report was sponsored by the Federal Transit Administration. The authors of the report are from the Center for Urban Policy Research at Rutgers University, the Brookings Institution, Parsons Brinckerhoff Quade and Douglas, Inc., and ECONorthwest. The report is a review of the literature on sprawl and aims to provide a usable definition of sprawl as well as some of its implications. In Section C, under Social Issues, the report summarizes and analyzes the literature about the fiscal strain municipalities feel with new development. In chapter 8, the linkages between sprawl and its positive and negative characteristics are discussed, while Section D focuses on operating, travel, and transportation costs.

Burchell, Robert W. & David Listokin. The Fiscal Impact Handbook. New Jersey: The Center for Urban Policy Research at Rutgers University. 1978.

This book was written by Robert W. Burchell and David Listokin, both are Professors and Co-Directors at the Center for Urban Policy Research at Rutgers, State University of New Jersey. The book provides detailed instructions on how to complete the six fiscal-impact assessment techniques: per-capita-multiplier, case study, service standard, comparable city, proportional valuation, and employment anticipation.

Burchell, Robert W. and Sahan Mukherji. "Conventional Development versus Managed Growth: The Costs of Sprawl." American Journal of Public Health, 93.9 (2003):1534-40.

This article was published in the American Journal of Public Health by the American Public Health Association, an organization made up of public health professionals working to improve the health of Americans. Robert W. Burchell and Sahan Mukherji are from the Center for Urban Policy Research at Rutgers University. They used a mathematical model to determine a 25-year fiscal-impact projection of traditional development and planned development in terms of land and infrastructure consumption, real estate development, and public service costs in the United States. They determined planned development is a more fiscally sound way to develop.

Burchell, Robert W., William R. Dolphin, and Catherine C. Galley. The Costs and Benefits of Alternative Growth Patterns: Impact Assessment of the New Jersey State Development and Redevelopment Plan. New Jersey: Rutgers University for Urban Policy Research, 2000.

The Center for Urban Policy Research at Rutgers University prepared this study for the New Jersey Office of State Planning. The goal of this study was to reexamine the impact of the New Jersey State Development and Redevelopment Plan (PLAN) to determine if it would be more beneficial for the state than traditional (TREND) development. The study examined economic, environmental, infrastructure, community life, and intergovernmental effects under both types of development. It concluded that the PLAN scenario provided more benefits for the state. This study was done to aid policymakers in making future decisions about the development within the state.

Center for Energy and Environment. Two Roads Diverge: Analyzing Growth Scenarios for the Twin Cities Region. Minneapolis: Center for Energy and Environment, 1999.

This study promotes the responsible and efficient use of resources in Minnesota. The goal of the report was to analyze the best way to handle future growth in the region while maintaining the integrity of the area and being fiscally responsible. Using the average-costing method, two growth scenarios were analyzed in six metropolitan areas and seven counties. It found that Smart Growth scenarios yielded significant cost savings.

City of Dover, Del. The Dover Plan. [www.cityofdover.com/media/documents/study-Comprehensive\\_Plan.pdf](http://www.cityofdover.com/media/documents/study-Comprehensive_Plan.pdf). 2003.

The Dover Plan is the comprehensive plan for the City of Dover, Del. A comprehensive plan is a document stating the goals and future vision of the city. It must be completed to be in compliance with Delaware Code. It notes areas where it would like to grow, develop, and change as well as what the city wants to maintain and keep the same. Under the annexation section of the plan, the City has stated there should be an analysis of what services it must provide, how they will be provided, and how much it will cost to service the area.

Delaware Office of Management and Budget. Cabinet Committee on State Planning Issues Report to the Governor and 144<sup>th</sup> General Assembly. [www.omb.delaware.gov/newsrm/documents/ccspi\\_rep\\_01\\_03\\_08.pdf](http://www.omb.delaware.gov/newsrm/documents/ccspi_rep_01_03_08.pdf). 2008.

This report was compiled for the Governor of Delaware as a way for the state to track the success of the Governor's Livable Delaware initiative. Livable Delaware is a project aimed at guiding future development toward areas able and ready to support more people with existing infrastructure while preserving open space and farmland. Growth in Delaware is projected to increase rapidly. This report's goal is to discuss how and what Delaware is doing to redirect growth and improve land-use patterns within the state.

Duncan Associates. Cost of Public Services Study. Minnesota: Minnesota Department of Agriculture, 1999.

This study, conducted by Duncan Associates and published by the Minnesota Department of Agriculture, aimed at determining the cost of new development in several rural counties. A statewide analysis was completed, examining the fiscal cost of new development for 240 cities, counties, and townships, 88 municipal water and sewer systems, and a sample of 200 independent school districts in Minnesota. There are also five case studies that were used to examine the potential fiscal impact of new development. The study found that traditional residential development puts strain on the local municipalities, but when development takes place within cities and higher-density areas, the cost is reduced and the development becomes more beneficial.

Edwards, Mary. "Fiscal Impact Analysis: Does Method Matter?" Journal of the Community Development Society. 32.1 (2001): 106-129.

This article was published in the Journal of the Community Development Society and was written by Mary Edwards, a community planner in Madison, Wisconsin. The goal of this article was to examine three fiscal-impact-analysis methods to find if the method chosen to complete the analysis affected outcome. The three methods used were per-capita-multiplier, proportional valuation, and case study. The results found that method did matter since each relies on different assumptions. The final recommendations from the article are to use at least two methods, if resources allow, and to remember that fiscal impact is just one part of annexation and development decision-making.

Esseks, J. Dixon, Harvey E. Schmidt, and Kimberly L. Sullivan. Living on the Edge: Fiscal Costs and Public Safety Risks of Low-Density Residential Development on Farmland. Washington, D.C.: American Farmland Trust, Center for Agriculture and the Environment. 1999.

The authors of this study are from the Division of Public Administration and the Department of Political Science at Northern Illinois University. The American Farmland Trust sponsored this report because of concerns about loss of farmland and farmland productivity due to sprawling residential development. The authors examined the costs of traditional development and delved into exactly who is subsidizing new growth in sprawling areas. Also examined were response times of EMS, police, and fire within low- and high-density areas. They found rural and low-density areas had longer response times for public health services and determined low-density areas also had increased costs associated with them.

Kotval, Zenia and John Mullin. Fiscal Impact Analysis: Methods, Cases, and Intellectual Debate. Lincoln Institute of Land Policy. 2006.

This is a working paper from the Lincoln Institute of Land Policy. The authors, Dr. Zenia Kotval (an Associate Professor of Urban Planning at Michigan State University) and Dr. John R. Mullin (President of Mullin Associates, Inc.) wrote this paper with the

intention of examining various fiscal-impact-analysis methods and the factors influencing the choice of which method to use. They also provide four new approaches for estimating the fiscal impact of new development and annexation that they feel are more comprehensive, taking into account social equity and values and interactions among various components and models to increase accuracy.

Maurer, George. *A Better Way to Grow*. Annapolis: Chesapeake Bay Foundation. 1998.

The Chesapeake Bay Foundation is an organization aimed at maintaining the health of the Chesapeake Bay and the surrounding area. This publication gives an informative presentation on many of the environmental problems that can arise from development and offers real-world solutions for actual areas of concern. It focuses solely on the non-fiscal costs of development on the environment.

Mix, Troy D. *Fiscal Impact Analysis and Annexation Decision-Making: Aligning State and Municipal Interests*. Newark, Delaware: University of Delaware, School of Urban Affairs and Public Policy. Submitted in partial fulfillment of the requirements for the degree of Master of Public Administration. 2004.

This paper was authored by Troy D. Mix as an analytical paper, which fulfills one of the requirements for the degree of Master of Public Administration at the University of Delaware. The purpose of this paper is to look at fiscal-impact analysis and see how it can be applied to annexation decisions, with the hope of making the decision easier. He uses a case study to gain a better understanding of the use of fiscal-impact analysis and the benefits it can provide, particularly in the state of Delaware. The paper finds fiscal-impact analysis to be a helpful tool in the annexation process and the recommendation is made to include it in Delaware's planning processes.

Natural Resources Defense Council. *Another Cost of Sprawl*. 1998.  
[www.nrdc.org/cities/smartGrowth/cost/costinx.asp](http://www.nrdc.org/cities/smartGrowth/cost/costinx.asp). Accessed June, 2008.

The Natural Resources Defense Council, an organization dedicated to solving many environmental issues, published this report. This is a study of the effects of development and land use on wastewater utility costs in the Chicago and Cleveland areas. Through its case studies, the report found the operation and maintenance of wastewater utilities increased as density declined.

Natural Resources Defense Council. *Paving Paradise: Sprawl and the Environment*.  
[www.nrdc.org/cities/smartGrowth/rpave.asp](http://www.nrdc.org/cities/smartGrowth/rpave.asp) Accessed June, 2008.

This paper is a condensed adaptation of a book titled *Once There Were Greenfields: How Urban Sprawl Is Undermining America's Environment, Economy and Social Fabric*. The Natural Resources Defense Council published this paper. It highlights some of the environmental damages current development trends can have, such as increased air pollution, run off, and loss or destruction of open space and farmland. It advocates smart

growth and encourages people to pressure governmental representatives and the private sector to change their actions.

Nelson, Arthur C. Planner's Estimating Guide: Projecting Land-Use and Facility Needs. Chicago: American Planning Association, Planners Press. 2004.

This book was written by Arthur C. Nelson, the Director of the Metropolitan Institute and Professor of Urban Affairs and Planning in the School of Public and International Affairs at Virginia Tech. This book was created to give planners a guide for estimating growth and needs of communities. He includes models to estimate residential land-use needs, employment land-use needs, public facility space and land-use needs, educational facility space and land-use needs, water and wastewater utility land-use needs, and to estimate land-use and facility needs of unanticipated development. The book comes with a CD that includes Excel versions of tables and a workbook for the reader.

Peiser, Richard B. "Does It Pay to Plan Suburban Growth?" Journal of the American Planning Association. 50.4 (1984): 419-433.

Richard B. Peiser is an assistant professor of real estate and regional science at Southern Methodist University. In this article he examines the economic results of planned and unplanned development in the Houston, Tex. area. This study consists of cost/benefit analyses for land use and transportation, as well as an analysis of the social costs involved with planned and unplanned development. He found planned development resulted in fiscal savings for water, sewer, and drainage. However, he found that roads cost more in planned development because there is more interconnectivity. This is in part due to his assumption that in unplanned development developers would not connect to other subdivisions and would only construct roads from their subdivision to the main road.

The Real Estate Research Corporation. The Cost of Sprawl: Environmental and Economic Costs of Sprawl. Washington, D.C.: U.S. Governmental Printing Office, 1974.

The Real Estate Research Corporation prepared this report to provide government employees, officials, and citizens a better understanding of the impact development has on infrastructure costs and the environment. It estimated costs for several neighborhood types using the average-costing method and was one of the first studies to report that compact development provided substantial fiscal savings over sprawling, traditional development.

Roser, Maureen Feeney. Fiscal Impact Model. City of Newark, Del. 1989.

Maureen Roser is a professional planner with the City of Newark, Del. This report serves as a guidebook to the city's fiscal-impact-analysis model that is used to assess the cost and revenue implications of proposed development in Newark.

Speir, Cameron and Kurt Stephenson. “Does Sprawl Cost Us All? Isolating the Effects of Housing Patterns on Public Water and Sewer Costs.” Journal of the American Planning Association. 68.1 (2002): 56-70.

Cameron Speir is a regulatory-pricing analyst of PacificCorp and worked as a research associate with Kurt Stephenson, an associate professor at Virginia Tech in its Department of Agricultural and Applied Economics. This article compares public water and sewer costs under various housing patterns using a cost-simulation model. The model compared the relationship between lot size, tract dispersion, and distance to the cost of providing services. It found that lots that are closer together and closer to existing infrastructure centers have lower infrastructure costs.

Tischler, Paul S. “Analyzing the Fiscal Impact of Development”. ICMA Management Information Service Report, 20(7). 1988.

The author, Paul S. Tischler, is the President of Tischler & Associates, a private consulting firm specializing in fiscal-impact analysis and economic strategies. This report was created to provide local officials a way to understand fiscal-impact analysis and allow them to conduct these analyses for their jurisdictions. The report goes into the benefits as well as risks of fiscal-impact studies and explains two of the more popular ways to calculate fiscal impacts: average-cost and marginal-cost approaches. There are case studies using both techniques to give the reader a better understanding of how the two techniques work in real-life scenarios.



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