Smart Growth America
Making Neighborhoods Great Together

THE FISCAL IMPLICATIONS OF DEVELOPMENT PATTERNS

# Indianapolis, IN

November 2015

# Analysis of Indianapolis, IN

Prepared by Smart Growth America for the City of Indianapolis, IN
*November 2015*

## Background and objectives

The connection between land use development patterns and the costs of providing public infrastructure and services has long been a topic of study, particularly since *The Cost of Sprawl: A detailed analysis* was published in 1974. Since that time, dozens, if not hundreds of studies, have been conducted relating to this topic. Most of these have concluded that "smart growth" (that is, more compact patterns of development) is associated with reduced local government spending on a per capita basis relative to sprawl (recognizing that the definition of each of those terms not entirely consistent). Smart Growth America's *Building Better Budgets* report, published in May 2013, summarizes the results of 17 of these studies.

Yet these findings are not often included in the typical fiscal impact analyses done in connection with new development proposals. There are many reasons for this, but the inconsistent methodologies used in the above-referenced studies, as well as the time-consuming data collection efforts they involve, have likely slowed the filtering of these academic findings into the "practice." Instead, most, (though not all) fiscal impact analyses rely on a simple average cost approach, which implicitly assumes that each new resident or job will add the same amount of public costs, regardless of whether they live and work in a sprawling, low-density development, or a high-density walkable urban one.

In connection with a grant from the Department of Housing and Urban Development, Smart Growth America ("SGA") has been developing a fiscal impact methodology that accounts for the increased cost efficiencies associated with denser development patterns, and can be adapted for use in scenario planning by local practitioners across the country. Indianapolis agreed to become a case study community in the development of this methodology.

## Scenarios

The City of Indianapolis asked SGA to analyze the net fiscal impact of future growth as it might occur around a station of the proposed bus rapid transit (BRT) line, as compared to the low density drivable development, which has dominated in the last 60 years. To conduct this analysis, SGA developed four development scenarios. All scenarios assume the addition of 3,000 households and 1,500 jobs, but in different layouts (see Table 1 on page 2).

The "Low Density Sub-urban" scenario approximates a typical drivable sub-urban development, e.g., predominantly single-family homes. The "Medium Density Sub-urban" scenario contains the exact same product mix as the Low Density Sub-urban scenario but on a more compact footprint that could fit within a half-mile radius of a station area. The "TOD Urban" scenario assumes that a greater share of the residential units would be multifamily or townhouses compared to the Low Density Sub-urban scenario, and would be even more compact layout than the Medium Density Sub-urban Scenario. Finally, the "TOD Urban Plus" scenario is exactly the same as the "TOD Urban" scenario in terms of development program, but makes two unique assumptions. First, it is assumed that 75 percent of the road infrastructure for the project is already in place and being maintained by the city. This is intended to approximate conditions in urban infill locations. Second, it is assumed that property values are on average 20 percent higher than in the other scenarios. This assumption reflects the demonstrated potential of walkable urbanism to generate value premiums. While this is a speculative assumption, a wide body of research has confirmed that dense, walkable environments enjoy significant value premiums of 20 percent and higher over typical suburban product.[1] These impacts must be considered when making a comparison between infill development and typical suburban development.

TABLE 1

## Development in four scenarios

| Unit Type | Low Density Sub-urban | Medium Density Sub-urban | TOD Urban | TOD Urban Plus |
|---|---|---|---|---|
| Single-family detached | 1,950 | 1,950 | 450 | 450 |
| Single-family attached | 150 | 150 | 750 | 750 |
| Multifamily units | 900 | 900 | 1,800 | 1,800 |
| Total units | 3,000 | 3,000 | 3,000 | 3,000 |
| Total gross acres | 952 | 409 | 210 | 210 |
| Net residential density | 4.2 | 10.3 | 20.3 | 20.3 |
| Commercial square feet | 488,000 | 488,000 | 488,000 | 488,000 |

These four scenarios illustrate a range of possible fiscal impacts associated with new development, depending upon whether it is more or less compact, and whether it occurs on greenfield sites (needing new infrastructure) or in locations within or proximate to existing development (utilizing existing infrastructure).

1 Cortright, J. (2009, August). "Walking the Walk: How Walkability Raises Home Values in U.S. Cities." CEOs for Cities. Retrieved September 4, 2015 from http://blog.walkscore.com/wpcontent/uploads/2009/08/WalkingTheWalk_CEOsforCities.pdf; Pivo, G. and Fisher, J. (2010, February). "The Walkability Premium in Commercial Real Estate Investments." University of Arizona. Retrieved September 4, 2015 from http://www.u.arizona.edu/~gpivo/Walkability%20Paper%208_4%20draft.pdf; Leinberger, C. and Alfonzo, M. (2012, May). "Walk this Way: The Economic Promise of Walkable Places in Metropolitan Washington, D.C." Brookings Institution. Retrieved September 4, 2015 from http://www.brookings.edu/~/media/Research/Files/Papers/2012/5/25%20walkable%20places%20leinberger/25%20walkable%20places%20leinberger.pdf.

# Key findings

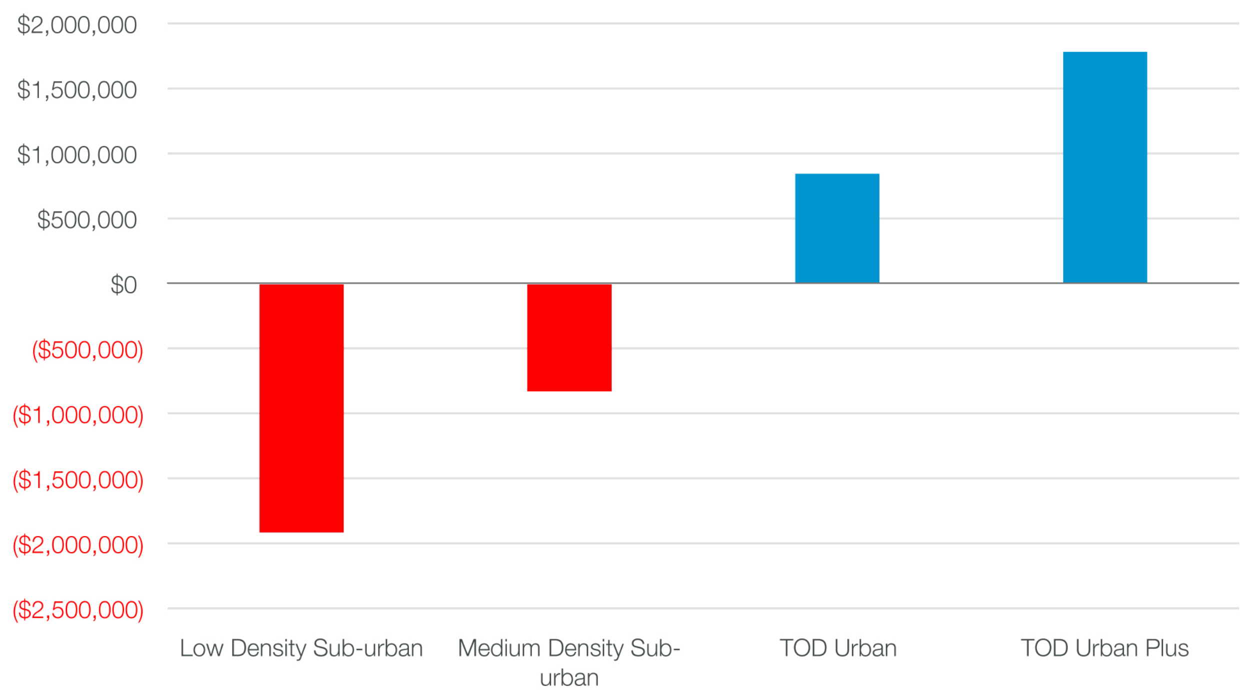
## Net fiscal impact

The net fiscal impact under the TOD Urban and TOD Urban Plus scenarios are dramatically higher for both the City of Indianapolis and the school transportation budget than either the Low or Mid Density Sub-urban scenarios (see Figure 1, below). In fact, both of the Sub-urban scenarios generate negative fiscal impacts, meaning the tax revenues they generate do not cover the estimated costs of providing government service. This is due to two key factors. First, the more compact layout in the TOD Urban and Urban Plus scenarios reduces City expenditures associated with road maintenance and fire protection. Second, the smaller units in the TOD Urban and Urban Plus Scenarios are likely to be populated with fewer residents, reducing costs. This accounts for 35 percent of the difference in net fiscal impact between the Medium Density Sub-urban scenario and the TOD Urban scenario. The TOD Urban Plus scenario achieves the best results because of the higher property value assumption described above and the use of existing infrastructure.

FIGURE 1

### Projected annual net fiscal impact at build-out

*City of Indianapolis and Indianapolis school transportation budget combined*

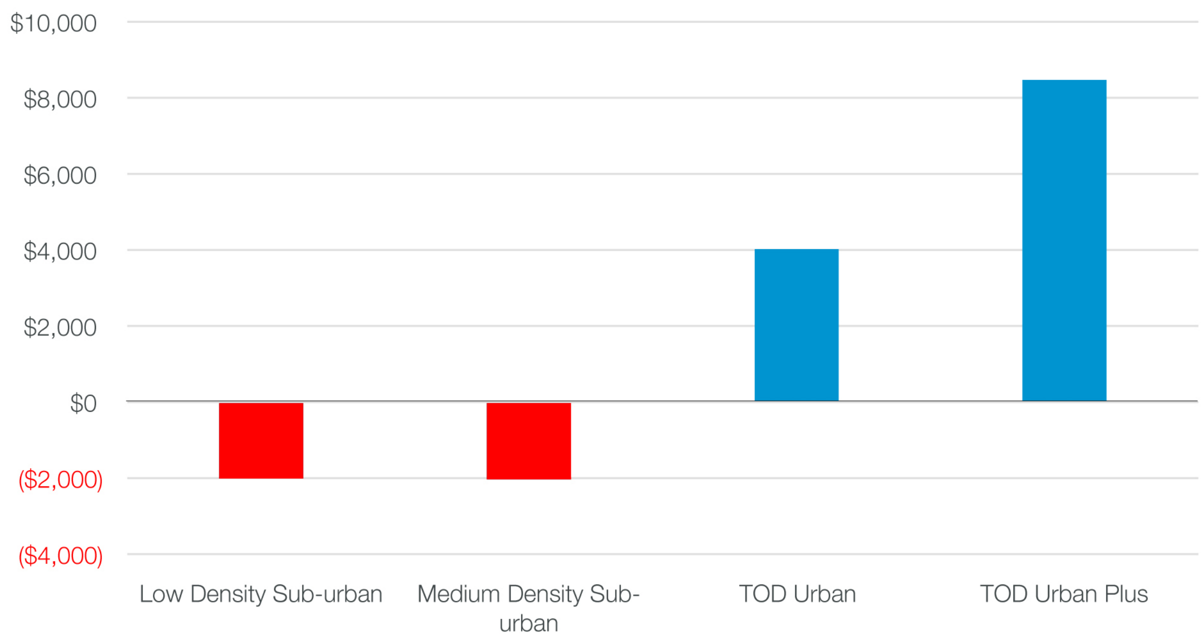



The net fiscal impact per acre largely confirms this trend (see Figure 2 on page 4). The TOD Urban and Urban Plus scenarios generate a higher net fiscal impact—both on an absolute as a well as a per acre basis—when the schools and the City are combined. Surprisingly, the results of the Medium Density Sub-urban scenario are no better than the Low Density scenario using this metric. Although the Medium Density scenario generates a better net fiscal impact on an absolute basis than the Low Density Scenario, as shown above, its impact is still negative, and is concentrated on fewer acres, thus the similar result on a per-acre basis.

FIGURE 2

## Projected annual net fiscal impact at build-out, per acre

*City of Indianapolis and Indianapolis School Transportation Budget Combined*




These results highlight the high opportunity cost of sprawl on public finances. The TOD Urban and Urban Plus scenarios would generate a greater positive net fiscal impact for both the City and the School District, while consuming far less land. In this case, infill or TOD development could avoid the need to develop up to 742 acres of land. Even if this land remained vacant it would generate property tax revenues. More importantly, however, is that leaving this land undeveloped means it could accommodate future growth and development—an opportunity that would be foreclosed under the low-density scenario.[2]

Table 2 on page 5 presents a summary of the results by scenario. The results reflect the estimated annual net fiscal impact, at build-out, of each scenario. The net fiscal impact is defined as the projected revenues minus the projected operating costs and certain annualized capital costs.[3] All results are presented in 2015 dollars.

Note that this analysis does not project all revenues or costs associated with schools. It only calculates the revenues and costs associated with school transportation.

2 The retained land could of course be put to a public purpose, such as new parks. In such a case, it might come off the tax rolls; nonetheless, it clearly has economic value, which might be approximated by considering the cost that would be incurred to purchase it for that purpose.

3 The model does not currently account for all public capital costs. Only capital costs associated with fire protection, road resurfacing, pipe reconstruction, and school construction are included. Capital costs not accounted for are assumed not to vary directly with density. Future versions of this model will attempt to develop a more comprehensive accounting of all capital costs associated with new development, depending on data availability.

TABLE 2

## Revenues, expenditures, and net fiscal impacts, by scenario

*"Per capita" estimates include residents and employees.*

Revenues

| | City of Indianapolis | | | Indianapolis Public School Transportation | | |
|---|---|---|---|---|---|---|
| **Scenario** | **Total** | **Per Capita** | **Per Acre** | **Total** | **Per Capita** | **Per Acre** |
| Low Density Sub-urban | $4,641,000 | $546 | $4,877 | $406,000 | $50 | $400 |
| Medium Density Sub-urban | $4,540,000 | $535 | $11,100 | $397,000 | $50 | $1,000 |
| TOD Urban | $4,394,000 | $588 | $20,900 | $464,000 | $60 | $2,200 |
| TOD Urban Plus | $5,093,000 | $682 | $24,200 | $568,000 | $80 | $2,700 |

Expenditures

| | City of Indianapolis | | | Indianapolis Public School Transportation | | |
|---|---|---|---|---|---|---|
| **Scenario** | **Total** | **Per Capita** | **Per Acre** | **Total** | **Per Capita** | **Per Acre** |
| Low Density Sub-urban | $6,577,000 | $774 | $6,900 | $385,000 | $50 | $400 |
| Medium Density Sub-urban | $5,668,000 | $667 | $13,900 | $98,000 | $10 | $200 |
| TOD Urban | $4,015,000 | $537 | $19,100 | $0 | $0 | $0 |
| TOD Urban Plus | $3,881,000 | $519 | $18,500 | $0 | $0 | $0 |

Net fiscal impact

| | City of Indianapolis | | | Indianapolis Public School Transportation | | |
|---|---|---|---|---|---|---|
| **Scenario** | **Total** | **Per Capita** | **Per Acre** | **Total** | **Per Capita** | **Per Acre** |
| Low Density Sub-urban | ($1,936,000) | ($230) | ($2,030) | $21,000 | $0 | $20 |
| Medium Density Sub-urban | ($1,128,000) | ($130) | ($2,760) | $299,000 | $40 | $730 |
| TOD Urban | $379,000 | $50 | $1,810 | $464,000 | $60 | $2,210 |
| TOD Urban Plus | $1,212,000 | $160 | $5,770 | $568,000 | $80 | $2,700 |

## Conservatism of the estimates

SGA was not able to model certain other cost drivers that may be density-related, due in part to a lack of sufficient data. Solid waste and recycling pickup, for example, is almost certainly less efficient in low density environments because of the greater distance, and therefore time and fuel between pickups. Similarly, school transportation costs should be expected to rise as students' residences are more dispersed, and school buses are required to travel farther. Because of the inability to obtain route information from the school system, SGA was only able to model savings associated with increasing the number of students in the walk zone. Police protection may also become less expensive in dense, walkable environments because of a need for fewer patrol cars and vehicle fuel and maintenance costs. The effective modeling of this relationship remains a task for future research. Thus, the estimations may understate, possibly to a significant degree, the net fiscal impacts attainable with future growth focused on more compact development.

# Methodology

## Revenues

**Property tax**

SGA developed assumptions regarding average property values based on a review of assessment records in the City of Indianapolis (see Table 3 below).

TABLE 3

### Property value assumptions, by scenario

| Type | Low Density Sub-urban | Medium Density Sub-urban | TOD Urban | TOD Urban Plus |
|---|---|---|---|---|
| Single-family detached | $188,000 per unit | $181,000 per unit | $181,000 per unit | $217,000 per unit |
| Townhouse | $150,000 | $150,000 | $150,000 | $180,000 |
| Multifamily rental apartment | $65,000 | $65,000 | $65,000 | $78,000 |
| Multifamily for-sale condominium | $125,000 | $125,000 | $125,000 | $150,000 |
| Office | $50/sq. ft. | $50/sq. ft. | $50/sq. ft. | $60/sq. ft. |
| Retail | $50/sq. ft. | $50/sq. ft. | $50/sq. ft. | $60/sq. ft. |

The following City property tax rates were applied under each scenario: 0.54 percent for single-family detached, single-family attached, and for-sale condominiums; 1.57 percent for office, retail, and multifamily rental apartments. The tax rates differ because of the so-called "circuit breaker," which limits the total property tax rate for all owner-occupied residential properties to 1 percent of the net assessed value, after taking account for certain homestead deductions. This analysis assumes that the reduction in the effective tax rate caused by the circuit breaker is shared on a pro rata basis among all local taxing authorities. So, for example, the total local property tax rate, including schools and the City is 2.92 percent (1.57 percent for the City, 1.35 percent for the Schools).[4] One percent represents 34 percent of the total. Therefore, for owner-occupied residential properties, we have assumed that the City collects 34 percent of the total 1.57 percent City tax rate, e.g. 0.54 percent. For rental apartments, the circuit breaker is 2 percent. This represents 68 percent of the total 2.92 percent tax rate. Again, this share is multiplied by the total City tax rate of 1.57 percent, resulting in an assumed property tax rate of 1.07 percent on rental apartments. The same logic was applied to estimate the school transportation tax rates for owner-occupied residential. Note that, for purposes of this analysis, all tax rates for dedicated funds other than schools, such as the library and health and hospitals, are aggregated into one City tax rate. We have not attempted to project revenues or costs for each dedicated fund.

### Income tax

The analysis includes income tax from residents of the development program. The incomes for each owner-occupied household were estimated based on the assessed value of the home or apartment. For all owner-occupied units, household income was assumed to equal 25 percent of the assessed value. For rental apartments, we assumed a household income of $35,000. A tax rate of 1.62 percent was applied to the estimated household income to generate the income tax estimates.

### Miscellaneous revenues

Residents and employees of the development were assumed to generate revenues related to licenses, permits, fees, and certain other miscellaneous sources at the same rate as current residents and employees. These revenues were assumed to not vary by density.

## Expenditures

### Density-related expenditures

SGA divided the expenditures associated with new development into two basic categories. The first includes those that are likely to be affected by the density of the development while the second includes all other expenditures. For purposes of this analysis, SGA has treated expenditures on the maintenance of roads, as well as fire protection and school transportation as density-related. This represents approximately 20 percent of the total operating expenditures in Indianapolis. Other expenditure categories, in particular solid waste pickup, and police protection are likely also affected by the density of development but the available information was not sufficient for SGA to credibly analyze the relationship for all categories.

### Roads

SGA's analysis shows that there is a strong inverse relationship between road length and area per capita, and the density of development in Indianapolis. Using GIS, a grid of equal-sized 100 acre

4 There are many different taxing districts within Marion County. For purposes of this analysis, tax rates from District 101, representing the Center of Indianapolis, were used. All non-school tax districts and authorities were aggregated to the City of Indianapolis for purposes of this report.

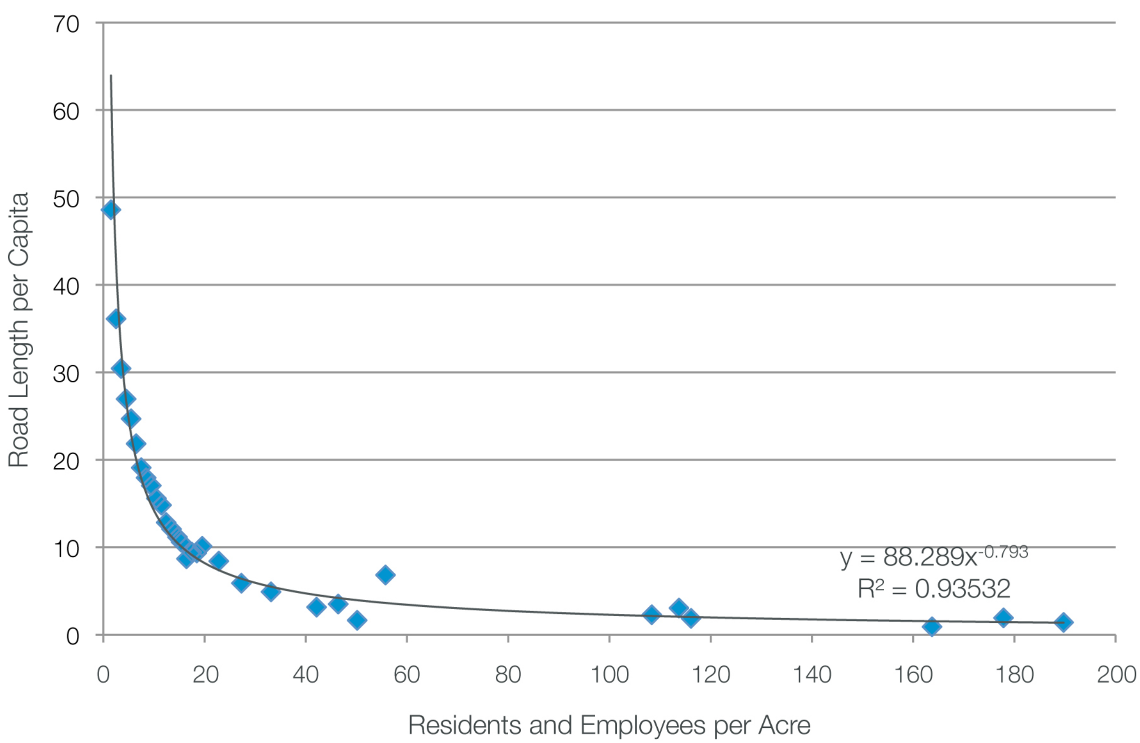
cells was drawn across Marion County and the number of residents and employees determined, as well as the road length and area in each cell. From these data points, a formula was derived estimating both the road length and area needed per capita, at any reasonable density, assuming that the new development conforms to historical experience in the area. Figure 3 on page 8 shows this data as a scatterplot, with road length per capita on the y axis and the density (measured in terms of residents and employees per acre) on the x axis, along with a regression formula describing the relationship between the two factors.[5]

A Figure 3 below shows, there are significant improvements in efficiency when moving from typical suburban densities of 4-5 people and employees per acre to approximately 40 persons and employees per acre. The quantity of roads per capita decreases only slightly as density increases.

(While the chart below depicts road length only, SGA found a similarly strong relationship between road area and population/employment density.)

FIGURE 3

## Road length and area needed per capita




The capital costs for new roads is assumed to be paid by the developer; however, the City must maintain all roads. The City of Indianapolis estimated that roads generally cost $2.46 per square foot to resurface and must be resurfaced every 15 years depending on usage. The cost of resurfacing is annualized by dividing the estimated resurfacing cost by the expected lifetime of 15

5 Note that each point may not represent one cell. Instead, values for all cells within certain density categories have been averaged and presented as one point.

years. In addition, the model assumes that the new roads would generate the same average costs per square foot in terms of pothole repair and snow removal as all other roads in Indianapolis. Note that this model does not currently estimate the additional demand placed on off-site roads, which may also incur maintenance costs.

**Fire/EMS protection**

To be effective, fire and EMS services must respond to emergency calls in a short amount of time. The specific response time varies by community, but fire service budgets and capital requirements are typically based on an established standard. This necessarily means that, for any given response-time standard, the efficiency of fire service will be dependent on the density within the "fire service shed" (the geographic area served by a station). If it is developed at a very low density, then the cost of service, including the cost of the station, the ambulances, fire engine/ladders, and their staff will be spread over a few people and employees, and likely a low property tax base. However, only the station costs are fixed. If density increases enough, the additional population will eventually require new fire service vehicles and staff to serve them. To estimate when this need would happen, SGA estimated the average call rate per person in Indianapolis based on publicly available data, and assumed that each fire engine could handle a maximum of 2,500 calls per year. SGA assumed a 4-minute response time standard, the current standard for the Indianapolis Fire Department. Assuming one minute for dispatch, this equates to a three-minute travel time for the fire engine. SGA estimated the distance that the fire engine could travel using a formula developed by the RAND institute and in use by the Insurance Services Office (ISO), an organization that analyzes the risk associated with public protection services for insurance companies.[6] SGA translated the distance the engine could travel in four minutes into the acreage of the response shed from a hypothetical station at the center of the proposed development.[7] Based on these assumptions, we found that the maximum service capacity for one fire engine and ambulance can be reached even at relatively low densities of approximately 6-7 residents and employees per acre. Therefore, the incremental operating efficiencies associated with rising density are already more or less maximized, even at low densities.

The capital cost of the station, however, is more fixed. Though additional bays may need to be added as the population of the response shed increases, much of the station would remain the same. These costs can then be "spread out" over more people and a larger property tax base as density increases.

Based on information provided by the City and additional sources, SGA estimated the cost of constructing a fire station, purchasing the necessary vehicles and equipment, and operating the vehicles, on a per capita basis, assuming the fire response shed is built out at the same density of the scenario. This per capita cost is then multiplied by the number of residents and employees in the development in each scenario.

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6 Fire Chiefs Online. "Response-Time Considerations." Retrieved September 4, 2015 from https://firechief.iso.com/FCWWeb/mitigation/ppc/3000/ppc3015.jsp.

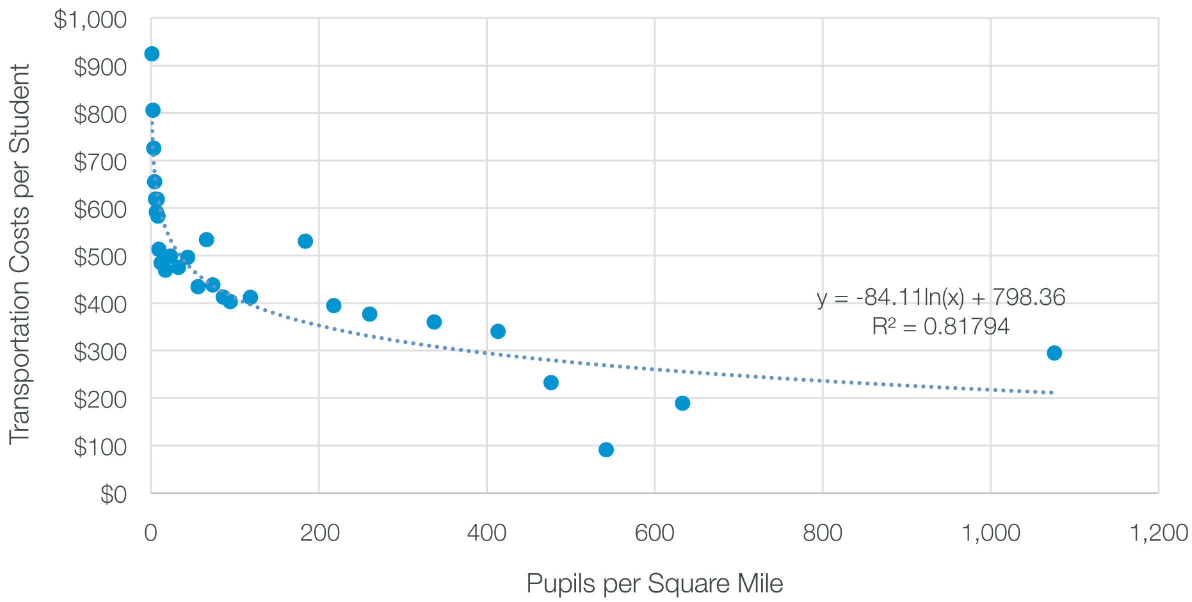
7 The estimate is based on the assumption that the fire engine response shed is roughly equivalent to the area of a circle with its center at the station, and radius equal to the distance the fire engine can travel in four minutes, after discounting the distance for connectivity issues. SGA estimated the appropriate discount by comparing the actual areas of various response sheds, using the street network, to the area in a whole circle.

**School transportation**

All else being equal, school transportation costs should decline in areas of higher density, for two reasons: a) more students will live within the “walk zone” (close enough that they are expected to walk to school), and; b) for those who are bused, school buses should have smaller distances to travel, saving on fuel costs and other operating costs. Data collected by the state of Wisconsin and other states on district transportation costs bears this out – transportation costs per student clearly decline as density increases. Figure 4 below, based on data from the Wisconsin Department of Public Instruction, illustrates the relationship.

FIGURE 4

## Transportation costs per student




SGA’s model calculates school transportation costs by estimating the number of students that are likely to be within the “walk zone” of any given school, assuming that the area around it is populated at the same gross density as the planned development in each scenario. Based on American Community Survey Public Use Microdata (PUMS) data for Marion County, we estimated the number of students that would live in each development scenario and calculated the density of students per acre. The average student density was multiplied by the acreage of the walk zone for each school type (Elementary, Middle, and High). The number of likely students in the walk zone was then compared to the typical school size by type. If the number of students likely to be in the walk zone met or exceeded the typical school capacity, then transportation costs were assumed to be zero. If the number of students within the walk zone was less than the capacity of the school, the remainder were assumed to be eligible for school bus. We assumed that 66 percent of bus eligible students would actually use school bus service. Every bused student was assumed to generate an annual cost of $1,500 to the school district. No data was available to estimate the actual cost per bussed student in Indianapolis’ public schools but this estimate is based on information from previous analyses conducted in Macon, GA; Madison, WI; and West Des Moines, IA.

This model does not account for bussing due to reasons other than the distance from the school, e.g. integration, magnet schools, etc.

**Non-density related operating expenditures**
For all expenditures deemed not related to density of development, SGA applied the conventional methodology of average costing, whereby expenditure categories are averaged across the number of residents and employees in the jurisdiction. Each new resident and employee is assumed to generate these same costs. The distribution of costs between residents and employees is imprecise, as municipalities typically do not and/or cannot track expenditures at this level of detail.

SGA used judgment in this regard, informed by the total proportion of residents to employees in Indianapolis. For the most part, residents were assumed to generate 75 percent of each major line item, and employees working in the City, 25 percent. Note, however, that the allocation of these costs can have significant impact on the results, particularly when comparing development scenarios with different ratios of residents to employees. SGA recommends that the City of Indianapolis review these assumptions carefully.

## Notes on interpretation

This study is intended to provide an estimate of the different costs and revenues associated with development at different densities. To that end, it compares annual revenues for each scenario at full build-out. It does not account for the time until build-out, which may well vary depending on the scenario. It also is a better calculator of the difference between scenarios, rather than the actual net fiscal impact in any given year of one scenario. This is mainly because major capital costs are annualized to provide an estimate of the overall long-term average costs. In reality, the County may need to spend very little money in the early years on maintaining infrastructure, for example, before eventually making a large balloon payment when infrastructure reaches the end of its lifetime. This model essentially assumes that the County saves up enough each year to make the large payment. The City's actual practice may differ, of course. In addition, the model does not account for all capital costs that may be generated by new development. For example, the capital cost of new police stations, libraries, and recreation facilities are not currently included in the model. These cost items were assumed to be either independent of density or SGA did not have sufficient data to establish a relationship between density and their costs. Therefore, the inclusion of these costs might reduce the net fiscal impact of each scenario but the difference between scenarios, and the basic conclusions of this analysis, would remain unchanged.

The model also does not specifically account for the capacity of existing infrastructure. This is a deliberate choice, for two reasons. First, the information on school, police, and fire capacity is difficult to obtain. Particularly, with respect to police, and fire, there are often no objective standards on when a new staffing or equipment is required. Second, and perhaps more importantly, it is questionable to attribute the cost of a new station or school entirely to the new development that happens to push facilities beyond their "tipping point." Growth in prior years is equally responsible. For that reason, it is more important to understand the long-term average costs and apply them equally. The key point is that, while such a quantification may be important for a full fiscal impact analysis of prospective development, it would not affect the results here, because any such variation is likely to be the same regardless of the density of the development alternatives. In this analysis, our effort is simply to discern fiscal impacts that vary based on development pattern.

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**Smart Growth America** is the only national organization dedicated to researching, advocating for, and leading coalitions to bring better development to more communities nationwide. From providing more sidewalks to ensuring more homes are built near public transportation or that productive farms remain a part of our communities, smart growth helps make sure people across the nation can live in great neighborhoods. Learn more at www.smartgrowthamerica.org.