Smart Growth America
Improving lives by improving communities

THE FISCAL IMPLICATIONS OF DEVELOPMENT PATTERNS

St. James Parish, Louisiana

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Prepared for the
Parish of St. James

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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 related 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 is 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 analysis 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 advanced 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.

The Cost of Sprawl, published by the Real Estate Research Corporation in 1974, was the first study to show that providing infrastructure to low-density, sprawling development costs more than for compact, dense developments. Low-density development's greater distances among homes, offices, shops, etc., require more road and pipe infrastructure than would be required to serve the same number of homes and businesses in a more compact development pattern. Looked at another way, one mile of infrastructure costs roughly the same to build no matter where it is, but that mile can serve many times more people in a high-density place than in a low-density place.

As part of the U.S. Department of Agriculture Rural Development program, Smart Growth America ("SGA") aims to apply our fiscal impact methodology that accounts for the increased cost efficiencies associated with denser development patterns. This report applies our fiscal impact methodology to the Parish of St. James, Louisiana.

Although population projections developed by SGA predict an overall decline in population for St. James Parish over the next 20 years, this analysis considers how the Parish of St. James might still accommodate isolated demand for 4 new housing developments similar to existing development patterns in the Parish. Another 4 housing developments, each similar to Bellevue Lakes within the Parish, would amount to 460 households over the next 20 years (by 2036). Density matters in terms of what new growth would cost the Parish.

We assessed three scenarios:

- A Baseline scenario with growth at densities of 2.8 people per acre (1.0 households per acre) in greenfield development similar to that observed in the Bellevue Lakes development within St. James Parish.

- Alternative A, which uses a density of 7.0 people per acre (2.5 households per acre) for new growth and assumes all new development will be in greenfield. This density level equates to the high densities that exist within the Parish towns of Gramercy and Lutcher.

- Alternative B, which also uses 2.5 households per acre, but does so at a mix of 50 percent infill and 50 percent greenfield development.

Under the Baseline Scenario, the Parish would face a 20-year cost of $34.6 million in providing additional infrastructure to accommodate the new growth. The most aggressive alternative, Alternative B, costs substantially less: $12.5 million over 20 years. This represents a potential savings of $22.1 million. The cost savings are the result of reduced roadway, sidewalk, and fire hydrant costs at higher densities and infill development.

St. James Parish Population Projection

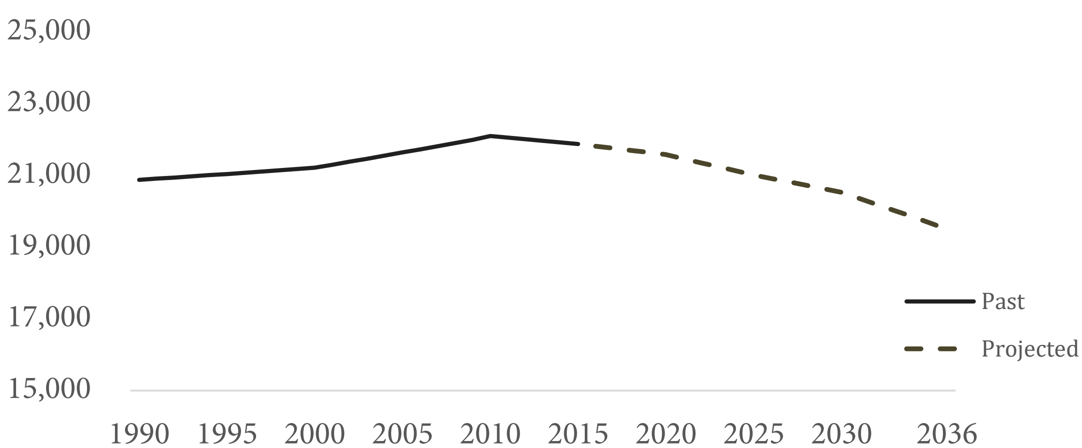
While the population of St. James Parish rose slightly in the 1990s, the population has been decreasing since 2010 according to the 2015 American Community Survey. Population projections developed by Smart Growth America project a decrease in overall population by approximately 2,300 people (about 10 percent) over the next 20 years. Figure 1 and Table 1 below illustrate the assumed population changes for the Parish of St. James.

We developed a population projection specific to St. James Parish using a cohort survival model method. This model calculates future populations based on three factors, each of which are specific both to the parish and by age, that affect population: life expectancy, birth rates, and migration trends.[i] The projection produces a population estimate similar to that used by the American Community Survey, but projected an additional 20 years further to 2036.

Although the overall population is projected to decline, there is still the possibility that St. James Parish could experience isolated growth for new developments within the housing market. For example, Bellevue Lakes is a suburban development built over the past decade that contains 115 homes over an area of about 115 acres. This fiscal impact analysis addresses the question, **"What would it cost to accommodate four more subdivisions, each with approximately the same number of households as Bellevue Lakes (460 additional households) over the next 20 years?"** As our approach suggests, the answer depends on choices about density and infill development.

Figure 1

St. James, LA Population and Forecast (2016 +)



Source: Smart Growth America, 2017

TABLE 1

	2016	2026	2036	Change 2016 to 2036
Population	21,821	20,919	19,510	-2,311

Source: Smart Growth America, 2017

Development Scenarios

SGA worked together with the Parish of St. James to develop alternative development scenarios. The development of these scenarios considered factors such as existing density levels, and plausible future densities. We then used geographic information systems (GIS) analysis to divide the Parish into equal 90-acre cells, and to identify the population and job density of each cell based on U.S. Census data.[ii]

Based on the GIS analysis, the existing average density in the Parish of St. James (excluding agricultural land uses) is 0.95 people per acre. At St. James Parish's average household size of 2.8 people per household, this equates to 0.33 households per acre. In other words, the average density across the entire Parish of St. James suggests that the average household is on a lot greater than 1 acre. This is despite the fact that average densities we observed in towns such as Gramercy and Lutcher were around 7 people per acre. The average density level is reduced primarily due to very low-density development within the Parish limits, especially in more rural areas.

St. James Parish Key Stats
(Excluding Agricultural Land)

0.95 people / acre
AVERAGE POPULATION DENSITY

0.33 households / acre
AVERAGE HOUSEHOLD DENSITY

7 people / acre
SCENARIO POPULATION DENSITY

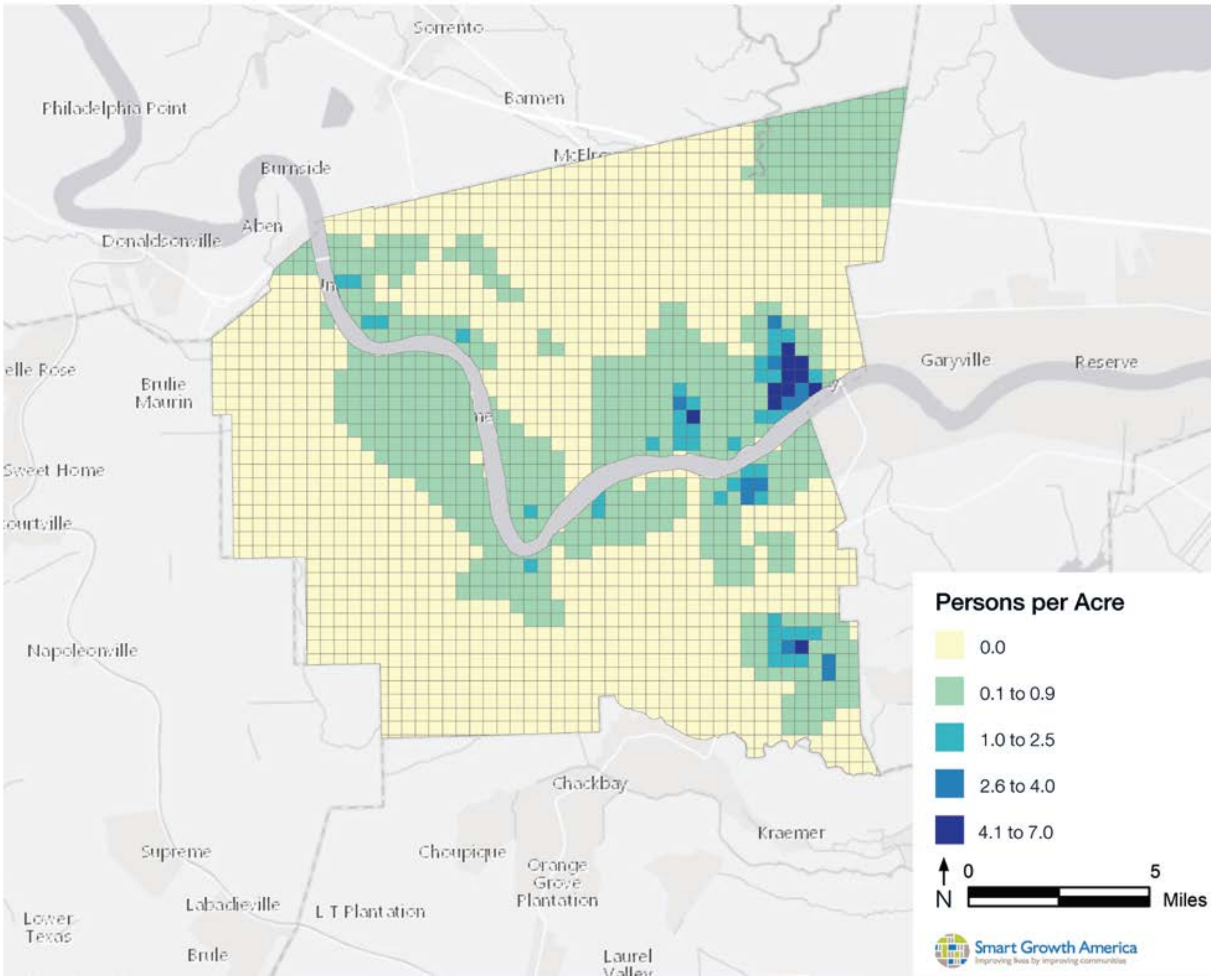
2.5 households / acre
SCENARIO DEVELOPMENT DENSITY

7 people / acre
HIGHEST OBSERVED DENSITY IN ST. JAMES PARISH

Figure 2 illustrates the densities across the various analysis cells in St. James Parish. As seen, the highest population densities exist within the towns of Gramercy and Lutcher as well as within South Vacherie. Many of the traditional residential communities, represented in shades of blue in Figure 2, have density levels ranging from 4 to 7 people per acre.

FIGURE 2

St. James Parish, LA Population Density, 2010



Source: Smart Growth America, 2017; U.S. Decennial Census, 2010

This analysis assesses three potential development scenarios to accommodate the additional 460 households (1,360 additional residents.)

The Baseline Scenario assumes that new development would continue at an average density of 2.8 people per acre similar to the sub-development of Bellevue Lakes. This equates to a residential density of 1.0 households per acre.

Alternative A represents accommodating new growth at 7 people per acre comprised completely of greenfield development. This represents about 2.5 households per acre.

Alternative B represents the same density levels as Alternative A, 2.5 households per acre, but incorporates a mixture of 50 percent greenfield development and 50 percent infill.

TABLE 2

St. James Parish, LA Density Alternatives

	Baseline	*Alternative A Dense 100% Greenfield*	*Alternative B Dense 50/50 Greenfield, Infill*
Population per Acre	2.8	7.0	7.0
Total Gross Acres	460	75.7	75.7
Households per Acre	1.0	2.5	2.5

Source: Smart Growth America, 2017

Accommodating the new residents at these density levels would lead to vastly different physical footprints. The Baseline Scenario would require 460 acres of development; and Alternative A and Alternative B would require 75.7 acres as illustrated in Figure 3. Alternative B would be built at the same density as Alternative A, but it would provide additional cost savings by using a mix of infill and greenfield development.

Methodology

Infrastructure items considered:

- ROADS
- SIDEWALKS
- FIRE HYDRANTS

This analysis is limited to three expenditure types for the Parish of St. James: Roads, sidewalks, and fire hydrants. We selected these items based on the available data from the Parish of St. James, and we consider these items for sketch planning purposes. There are many other infrastructure costs, such as storm and wastewater management, police and fire services, schools, and civic infrastructure that are also part of planning for population growth. Focusing on only these three items narrows in on costs that have a strong relationship to population densities, which can be estimated given the sketch level planning scenarios. **Because this analysis does not use all possible infrastructure items, the costs we present are likely a conservative estimate of what future development would actually cost the Parish.**

For each expenditure item, the Parish of St. James provided appropriate GIS shapefiles. We then applied those infrastructure items to the 90-acre cell grid, and this process allowed us to calculate unit density (e.g. "roads per acre").

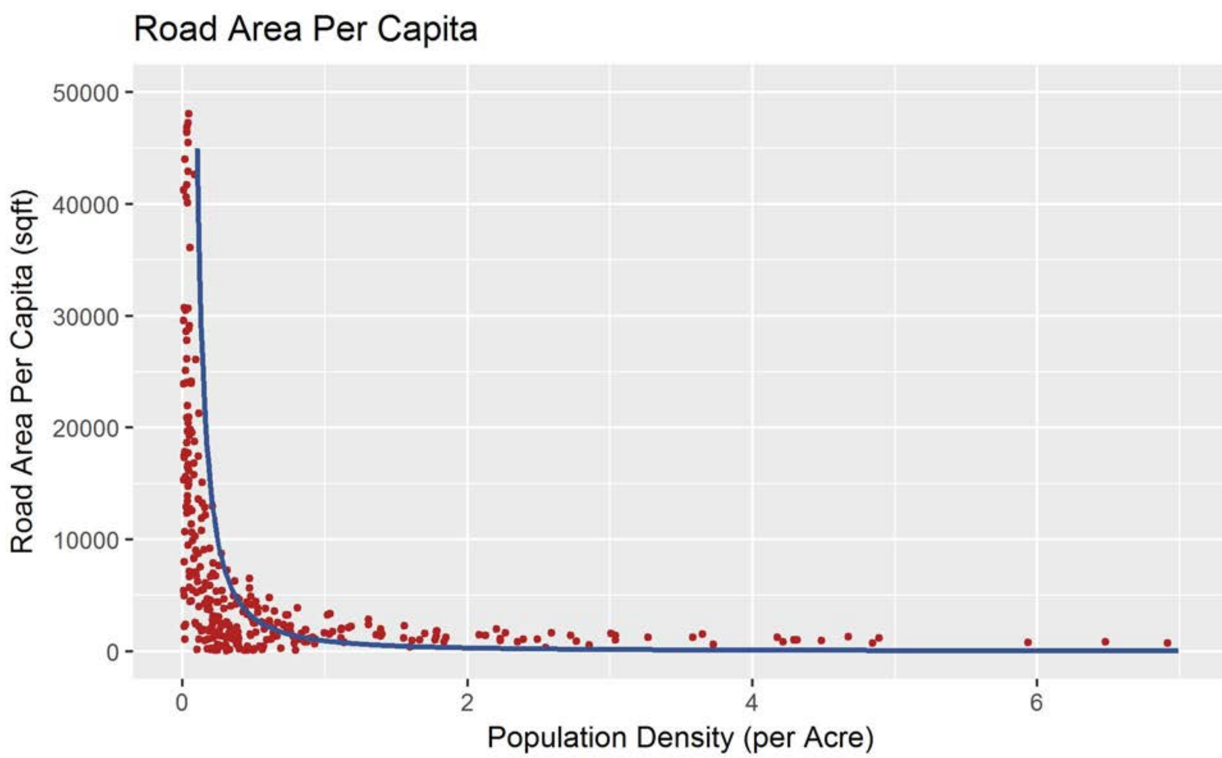
Next, we applied estimates of units per acre, for each infrastructure item, as the basis of an ordinary least squares ("OLS") regression analysis. In creating the data set, the unit of analysis was the 90-acre cell. The result is a set of models that estimates unit density (e.g. "roads per acre") as a function of population density (e.g. "people per acre"). These models allow one to estimate the amount of infrastructure unit needed per capita as a function of density. This operation is critical because it distinguishes this analysis from prior "average cost analyses."

Take Table 3 as an example, which illustrates how "road area per capita needed" quickly and drastically decreases as a function of population density. At very low levels of population there are thousands of square feet of road needed per person. At higher density this decreases to levels of less than 1,000 and even less than 500 square feet per person because roads can be shared and distributed among more people.

This scatter plot is the basis of the regression analysis. We created unique models for each infrastructure item, with each item exhibiting a similar relationship. The scatter plots, resulting regression outputs, and cost itemization are reported in Appendix A.

TABLE 3

Road Area per Capita, by Density (St. James Parish, LA)



Source: Smart Growth America, 2017

Each model estimates the quantity needed per capita, and then the total quantity of infrastructure needed. Using those total quantities, we used item-specific cost factors, each of which were developed based on SGA research and coordination with the Parish of St. James.

The final step in this analysis was to add two additional costs: the costs of financing, and operations and maintenance costs. Infrastructure items are long-term capital investments, and governments typically issue bonds to pay for these investments. This analysis assumes that the financing cost to the Parish would be 2.2 percent interest over 20-years (a typical cost of long-term municipal bonds in 2016). Finally, the analysis adds operations and maintenance costs of 5 percent.[iii]

Results

There are two key results from this analysis. The first are the total 20-year costs, which are the total costs that our fiscal impact model estimated. For a sense of scale we report the results on a per-year basis (Table 4).

The second result is what we call *net fiscal impact* (Table 5). The net fiscal impact takes the total 20-year cost, and compares it against potential revenues of new residents. Here, we use an average revenue based on the Parish's 2016 budget of $1,136 per resident ($3,226 per household). The three scenarios all plan for the same level of growth. Therefore, they each would generate the same revenues. The only change among the scenarios is on the cost side. When we compare the revenues against the costs, the difference is the net fiscal impact. A negative net fiscal impact indicates that the Parish would lose money in accommodating the new growth; a positive net fiscal impact indicates that the Parish would actually make net revenues.

The results of this analysis (Table 4) show that the Baseline scenario would cost the Parish $34.6 million over 20 years. This equates to $1.73million per year, equivalent to 6.9 percent of the Parish's 2016 total budget revenues.[iv] Applying the estimated potential tax revenues from new residents yields a 20-year net fiscal impact of -$14.5 million, or -$0.73 million per year (Table 5).

Alternative A, which assumes a neighborhood density of 2.5 households per acre, would reduce the 20-year costs to $18.5 million. The 20-year net fiscal impact would be   +$1.54 million.

Alternative B is similar to Alternative A but adds 50 percent infill development. By exploiting existing infrastructure through infill development, this scenario substantially reduces costs. We estimate 20-year costs at $12.5 million ($0.62 million per year). The 20-year net fiscal impact is +$7.55 million (+$0.38 million per year).

TABLE 4

Results – St. James Parish Development Costs in Summary

(Millions $)	*Baseline*	*Alternative A*	*Alternative B*
Capital Costs – 20 years	$26.7	$14.3	$9.62
Amortized Costs (20 years at 2.2% rate)	$33.3	$17.8	$12.0
Maintenance Costs – 20 years	$1.33	$0.71	$0.48
Total Costs – 20 years	**$34.6**	**$18.5**	**$12.5**
Total Costs per Year	$1.7 (6.9% of revenues)	$0.92 (3.7% of revenues)	$0.62 (2.5% of revenues)

Source: Smart Growth America, 2017

TABLE 5

Results – St. James Parish Development Net Fiscal Impact

(Millions $)	*Baseline*	*Alternative A*	*Alternative B*
Total Costs – 20 Years	$34.6	$18.5	$12.5
Est. Tax Revenue - 20 Years	$20.0	$20.0	$20.0
Net Fiscal Impact – 20 Years	**-$14.5**	**+$1.54**	**+$7.55**
Total Costs – Annual	$1.73	$0.92	$0.62
Est. Tax Revenue – Annual	$1.00	$1.00	$1.00
Net Fiscal Impact – Annual	-$0.73	+$0.08	+$0.38

Source: Smart Growth America, 2017

Note: Net Costs shown as negative values. Positive values indicate net revenue generation.

Another way of looking at costs is to consider the marginal costs per new resident or household. This measure tells us, on the average, how much each new resident costs the Parish in terms of infrastructure. Under the Baseline Scenario, each new resident would cost the Parish $1,324 per year. This compares to $708 annually per resident under Alternative A; and $478 annually per resident in Alternative B (Table 6).

TABLE 6

Results – St. James Parish Development Costs per Capita (Marginal Costs)

	Baseline	*Alternative A*	*Alternative B*
Total 20-year Costs per Additional Resident	$26,473	$14,160	$9,558
Annual Costs per Additional Resident	$1,324	$708	$478
Annual Costs per Additional Household	$3,759	$2,011	$1,357

Source: Smart Growth America, 2017

The bottom row of Table 6 simply scales these per person costs to the household level. One way of interpreting these numbers is to think of them in terms of how much each household would have to pay the Parish to "break even" in terms of infrastructure. The Baseline Scenario would cost the Parish $3,759 annually for each new household; $2,011 annually for each new household under Alternative B; and $1,357 annually for each new household under Alternative B.

Alternative A and Alternative B represent noteworthy points for a revenue analysis, and it brings us back to what we observe for net fiscal impacts. Recall that the net fiscal impact calculations used the 2016 budget average revenues of $3,226 per household. This tells us that Alternative A and Alternative B have a marginal cost per resident *less* than the expected marginal revenues – a positive net revenue for the Parish.

These marginal costs result differ from the net fiscal impact because they do not consider the fact that new residents do not arrive all at once, and the net fiscal impact calculations do. When the revenues trickle in year-over-year, Alternative A is nearly neutral for a net fiscal impact of +$80,000 annually, and Alternative B has a positive net fiscal impact of +$380,000 annually.

This analysis tells us that ***development at existing average density levels would cost the Parish more money – only for these infrastructure items – than the Parish would likely receive in revenues.*** The costs are amplified when we consider the comprehensive set of infrastructure items; however, this is a simplified analysis for sketch planning purposes.

Revenues per household in these scenarios are likely to be lower than those shown here because most of the additional revenue to the Parish would be in the form of property taxes. This means that even higher levels of density would be necessary to have "cost neutral growth."

The net fiscal impact results underscore the notion that the new growth would create a cost to the Parish if future development continues to build at existing densities. Those additional costs would have to be made up somewhere. For example, under the Baseline Scenario, the Parish would have to generate $3,759 annually from each new household for the household to pay its own marginal costs. Hypothetically, the Parish could tax these new households $3,759 per year, but we know that is unlikely. What is more likely is that the costs would be distributed among the existing residents and businesses. The Parish could also depend on external funds or state funds to pay for the costs, but the point remains that these revenues would have to be generated from somewhere.

Finally, we convert the costs into "cost savings" relative to the Baseline Scenario. Using this point of view, Alternative A and Alternative B offer significant potential savings to the Parish compared to the Baseline. Alternative A would save the Parish $16.1 million over 20 years ($800,000 per year), while Alternative B would save the Parish $22.1 million over 20 years ($1.10 million per year).

TABLE 7

Results – St. James Parish Development Cost Savings

(Millions $)	*Baseline*	*Alternative A*	*Alternative B*
Total 20-year savings	-	$16.1	$22.1
Savings per year	-	$0.80	$1.10

Source: Smart Growth America, 2017

Conclusion

This analysis considers how the Parish of St. James might accommodate 460 additional households (1,306 residents) over the next 20 years (by 2036), which is roughly equivalent to the creation of four more subdivisions, each with the same number of households as Bellevue Lakes. The type of density matters in terms of what it would cost the Parish.

The Parish could accommodate new growth at existing average densities of 2.8 people per acre and do so at a cost of infrastructure provision of $34.6 million over twenty years, or a net fiscal impact of -$14.5 million after considering potential tax revenues of new residents.

An alternative scenario (Alternative A), which uses among the highest densities already observed in the Parish, would cost $18.5 million over the same period, or a 20-year savings $16.1 million. The 20-year net fiscal impact is +$1.54 million, meaning the scenario is just marginally revenue-positive.

A third scenario (Alternative B), uses higher densities and does so using 50 percent infill development. This scenario would cost $12.5 million over the same 20-year period, or a 20-year savings of $22.1million. At this point the Parish is "in the black," with a 20-year net fiscal impact of +$7.55 million.

In short, accommodating growth at denser development patterns of about 2.5 households per acre would save the Parish in the form of reduced hydrant, roadway, and sidewalk infrastructure costs. Accommodating development at this density with a mix of infill development will result in a *positive* net fiscal impact to the Parish.

This is a set of hypothetical scenarios for the Parish of St. James, with assumed development forecasts. However, it highlights the financial consequences of land-use decisions over the long term. The costs of low-density, sprawling development add up to significant amounts over time. Smarter growth, with more compact development patterns, would reduce long-term costs.

A few caveats to this analysis are warranted. First, because the population forecast assumes projections of an increase of 460 households over 20 years within the context of an overall population decline, the magnitude of the numbers can vary. This is also the case with the development scenarios, which are hypothetical scenarios for density levels for the new growth. An analysis of a specific scenario or development pattern, especially within a defined geography would allow for assessment of other factors such as the costs of fixed services like schools, fire, police, waste management.

Secondly, both Scenario A and the Baseline Scenario assume new development in a "greenfield" pattern. The more likely case, reflected in Scenario B, is that at least part of the new growth to the Parish will be absorbed in existing housing and commercial stock, or as infill development in the existing footprint. Costs of absorbing residents or jobs in existing stock are generally negligible to the Parish aside from some costs of additional government services. Also, costs for infill development vary greatly, with complex developments costing significant sums in infrastructure, while other types of infill development costing a fraction of what greenfield development costs. Generally, based on discussions and work with several municipalities, SGA finds that the costs of infill development to the government can be around 35 percent of what the same development would cost in a greenfield.

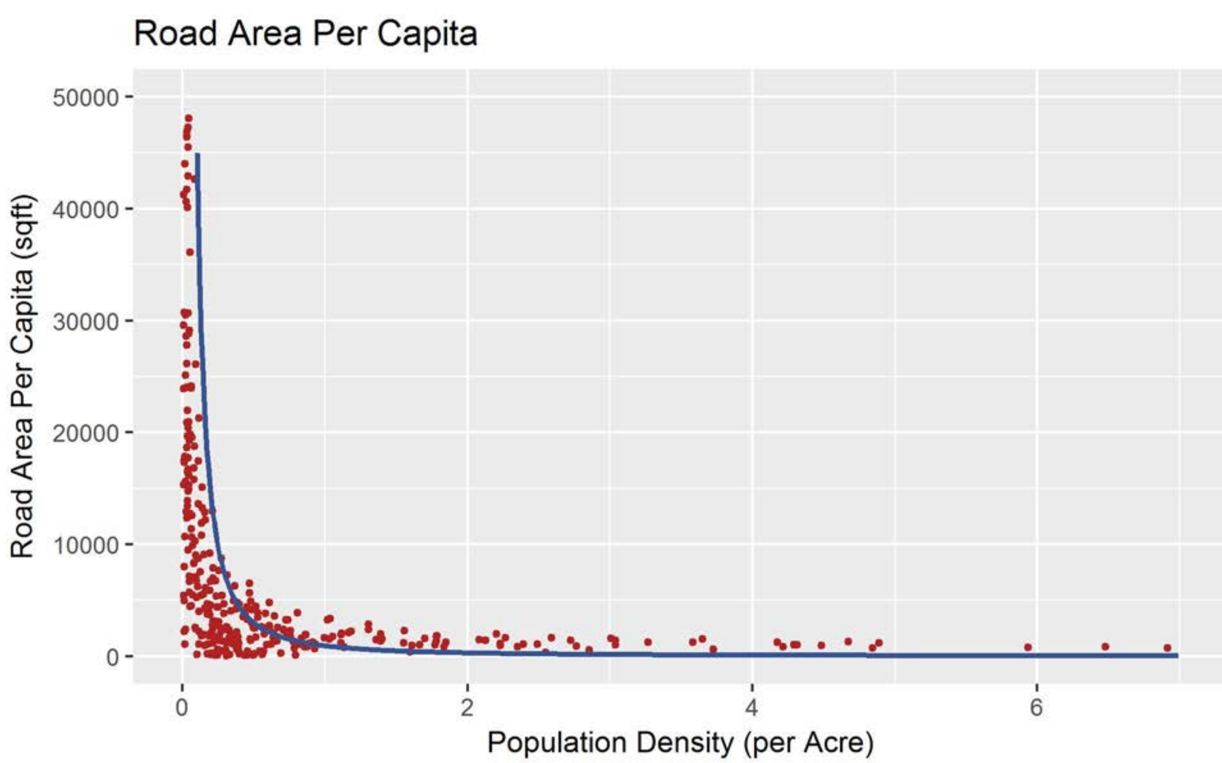
Finally, SGA conducted this analysis for the Parish of St. James using data particular to that community. These factors and magnitudes differ from community to community, representing the various policy and spending decisions that differ across the country. Infrastructure provision, especially on a per-capita basis, can vary widely from one place to another, even at similar density levels. Thus, it is best to understand these cost estimating models as best suitable for St. James. The parameter estimates themselves are not suitable for application to other communities, although the trends of higher density requiring fewer people per capita do hold.

This analysis should be used as a guideline for the Parish of St. James to consider the fact that context-sensitive higher density levels are not only beneficial from an economic, social equity, and environmental standpoint, they also make financial sense. As portrayed, the Parish stands to save an additional $22.1 million by building at dense levels already present in the Parish; and these levels of density that are easily congruent with the character of the community. Continuing to build at low-density levels would yield heavy capital costs for major infrastructure items, and these costs can be mitigated with a “smart growth” approach to new development.

Appendix A – Technical Output

Roads

	Baseline	Alternative A	Alternative B
Unit Cost ($ / sq. ft.)	$30	$30	$30
Est. Road Area per Capita (sq. ft.)	645.23	345.00	345
Est. Road Area Needed (sq. ft.)	842,923	450,705	450,705
Est. Cost of Road Needed ($)	25,287,681	13,521,158	9,126,782

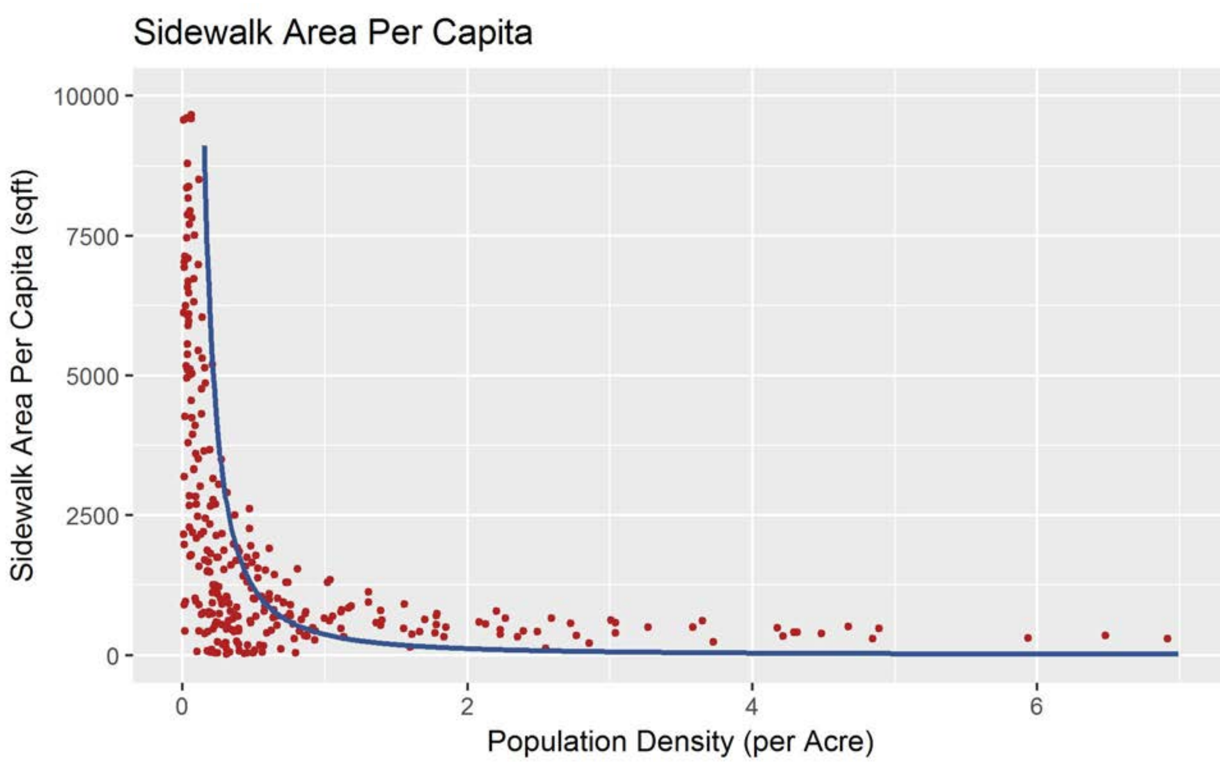


Road Area Per Capita by Population Density

Dependent variable:	ln(Road_Per_Capita)	
Mean:		11,650
Standard Deviation:		20,390
OLS:		
ln(Road_Per_Capita)=7.194+ -0.694*ln(population per acre)		
log(PopDensity)		-0.694
Standard Deviation:		-0.033
	t = -20.838	
	p = 0.000***	
Constant		7.194
Standard Deviation		-0.075
	t = 95.580	
	p = 0.000***	
Observations		341
R^2		0.562
Adjusted R^2		0.56
Residual Std. Error	1.017 (df = 339)	
Sum Squared Residuals		
F Statistic	434.212*** (df = 1; 339)	
Akaike criterion		13.80
Log-likelihood		-488.76
Note:		*p**p***p<0.01

Sidewalks

	Baseline	Alternative A	Alternative B
Unit Cost ($ / sq. ft.)	$4	$4	$4
Est. Sidewalk per Capita (ft.)	258	138	138
Est. Sidewalk Needed (ft.)	337,267	180,335	180,335
Est. Cost of Sidewalk Needed (ft.)	1,349,068	721,338	486,903

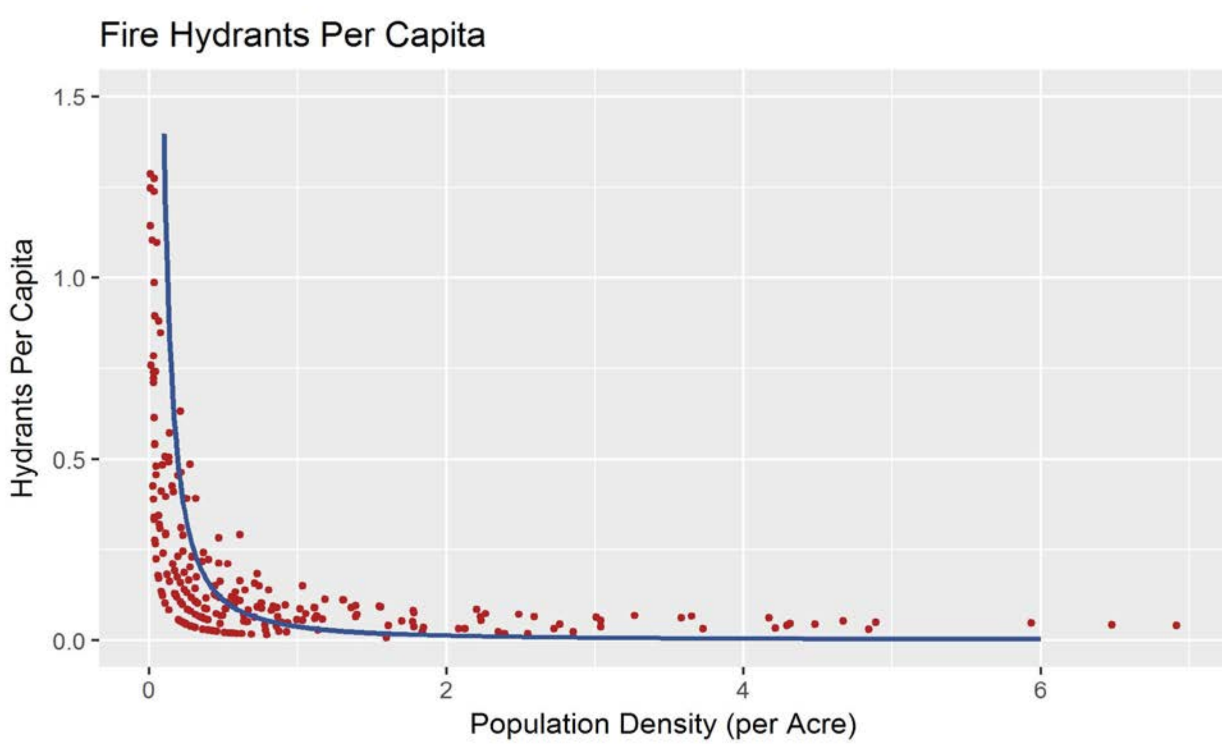


Sidewalk Area Per Capita by Population Density

Dependent variable:	log(Sidewalk_Per_Capita)	
Mean:		1,296
Standard Deviation:		8,156
OLS:		
=6.278+ -0.694*ln(population per acre)		
log(PopDensity)		-0.694
Standard Deviation:		-0.033
	t = -20.838	
	p = 0.000***	
Constant		6.278
Standard Deviation		-0.075
	t = 83.407	
	p = 0.000***	
Observations		341
R^2		0.562
Adjusted R^2		0.56
Residual Std. Error	1.017 (df = 339)	
Sum Squared Residuals		
F Statistic	434.211*** (df = 1; 339)	
Akaike criterion		13.80
Log-likelihood		-488.76
Note:		*p**p***p<0.01

Fire Hydrants

	Baseline	Alternative A	Alternative B
Unit Cost ($ / each)	$300	$300	$300
Est. Fire Hydrants per Capita	0.04	0.02	0.02
Est. Fire Hydrants Needed (each)	47	28	28
Est. Cost of Fire Hydrants Needed ($)	14,183	8,473	5,720



Fire hydrants Per Capita by Population Density

Dependent variable:	log(hydrants_Per_Capita)	
Mean:		0.0965
Standard Deviation:		0.2572
OLS:		
=-2.723+ -0.571*ln(population per acre)		
log(PopDensity)		-0.571
Standard Deviation:		-0.032
	t = -17.933	
	p = 0.000***	
Constant		-2.723
Standard Deviation		-0.054
	t = -50.838	
	p = 0.000***	
Observations		236
R^2		0.579
Adjusted R^2		0.577
Residual Std. Error	0.687 (df = 234)	
Sum Squared Residuals		110.36
F Statistic	321.606*** (df = 1; 234)	
Akaike criterion		-175.39
Log-likelihood		-245.18
Note:		*p**p***p<0.01

[i] Life Expectancy and Birth Rate were obtained from the Center for Disease Control for 2015. Migration Rates were determined using data from the CDC (2015) , ACS (5-Year Survey 2011-2015), and Decennial Census (2010).

[ii] The GIS analysis was conducted using ESRI ArcGIS. For population density calculations, areas not within the Parish's borders were omitted. Population was divided into 90-acre cells from Census Block data using an aerial-weighted average calculation. Major water features were omitted from the aerial weight calculation.

[iii] Five percent operations and maintenance costs is consistent with engineering cost estimates in other communities that Smart Growth America has interviewed. It is also consistent with contingency allowances for capital cost estimation. This is in the range of assumptions commonly used in transportation cost estimating. See: http://www.samtrans.com/Assets/_Planning/BRT/Operating+and+Maintenance+Costs.pdf

[iv] St. James Parish 2016 Budget.