

Rural Sustainability and the Built Environment

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Rod Bantjes
St Francis Xavier University

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INTRODUCTION

Since the publication of Jane Jacobs's *Life and Death of Great American Cities*, urban planners have been attracted to the ideal of high density, mixed-use "nodal" development. Jacobs's initial interest was in how this urban form promoted walkability, as well as equitable, vibrant and safe urban communities. The model has gained increasing attention for its ecological virtues as well. It favours walking and efficiency in the provision of public transit (as well as other utilities) and therefore a considerably reduced carbon footprint.

In this paper I use this ideal as a template to describe the structure of the built environment of Antigonish. I argue that Antigonish Town and its environs form a single urban-suburban system of extraordinarily low density – orders of magnitude below what Jacobs thought necessary for the vitality of public life in great cities. There is nonetheless a pedestrian culture and street vitality in the town core. Using GIS modelling I show how the walkable core has diminished over the last ten years, how people have likely been forced to rely somewhat more on cars and how they have had to drive those cars somewhat further. These are all negative outcomes for a community that is increasingly committed to sustainability.

I discuss the potential of GIS modelling as a tool both for tracking these trends and for planning to mitigate and possibly reverse them. However, as the comparison to Jacobs makes clear, the constraints on small, dispersed places like Antigonish are much greater than those on large cities. Even Jacobs's great city districts did not depend on local residents for their vitality, but also on through traffic. Similarly, Antigonish relies on its suburbs, whose residents, notwithstanding creative public transit solutions, still must come in primarily by car. Cars require space-hungry infrastructure that threatens the high-density, mixed-use core.

URBAN FORM AND LIVEABILITY: JANE JACOBS IN THE COUNTRYSIDE

"Men thinly scattered, make a shift, but a bad shift, without many things ... It is being concentrated which produces convenience." (Dr. Johnson cited in Jacobs, 1961)

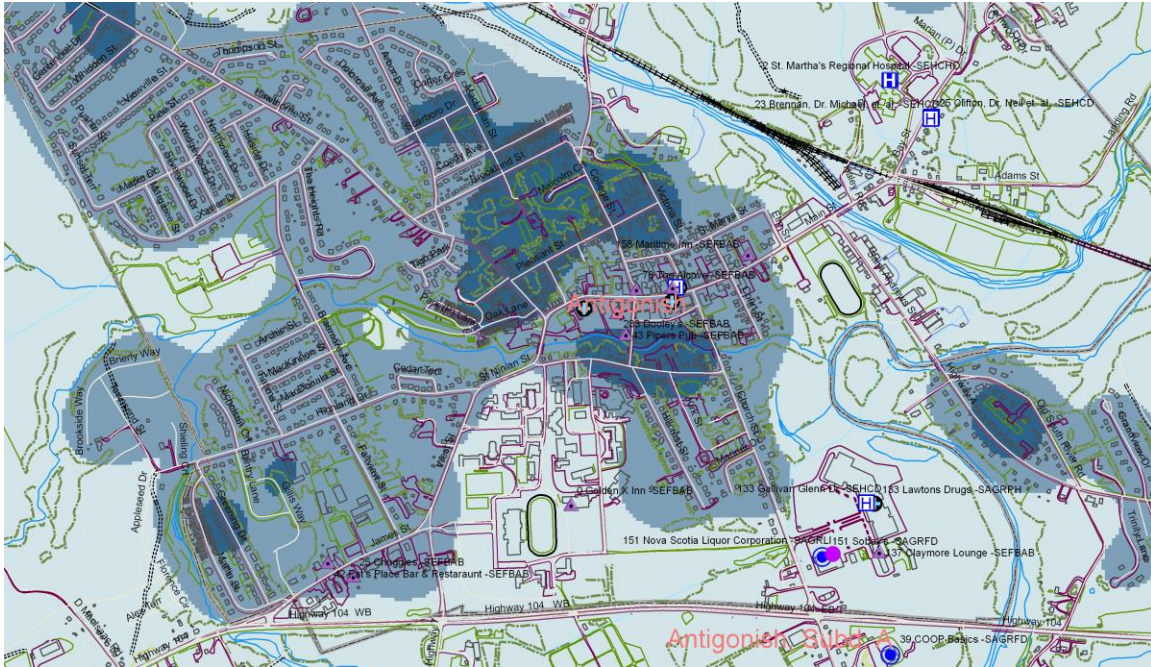
Density of residential dwellings was for Jane Jacobs one of the conditions that fostered lively, attractive, and safe districts in large cities. People are attracted to places where other people are present on the streets. Businesses and culture too flourish where human traffic is concentrated. People come to such places for instrumental reasons, but even if they are passing through they are drawn to lively streets because these are less boring and dangerous than dead and deserted streets. The more "eyes on the street" the less likelihood of crime.

None of these positive effects occur without foot traffic. Local residents provide the core of people who spend time on or observing the streets, but the activity on the streets depends also on strangers who are drawn to the offices, cafes, shops, bookstores and bars,

or who pass through on their way to other places. To accommodate foot traffic filtering through an area, Jacobs advises that streets always be through streets (i.e. no cul-de-sacs) and that they have numerous openings into them (i.e. short blocks).

High density of foot traffic also attracts diversity. The larger the selection of people that streams past a storefront in a week, the greater the opportunity for serving specialized interests and minority tastes. Here is where the art-house theatre or the North African restaurant are more likely to thrive. Conversely, diversity, or what Jacobs calls mixed use, increases the density of foot traffic. The "primary functions" of a district put different people on the streets at different times of the day. The inhabitants of office buildings flood the streets for brief periods in the morning, at lunch break and at the end of the work day; theatres bring people out after supper and so on. Continuous traffic better supports a whole assortment of secondary retail, service and leisure functions. Distributing the density of traffic throughout different times of the day also improves security for residents and transients alike. Jacobs argues, surprisingly, that late-night bars add to the safety of neighbourhoods because they ensure that there are "eyes on the street" long after dark.

Jacobs is describing synergistic effects that occur only once a certain threshold of density of foot traffic is reached. She is wary of quantifying this threshold. Her implicit problem is that she has no direct measure of density of foot traffic. She uses residential density as a surrogate. (She avoids using population density because high population densities can be indexes of the sort of tenement overcrowding that an earlier generation of urban planners was so keen to avoid in cities.) She insists that high residential density must be associated with short blocks and primary mixed use to ensure pedestrian traffic flow. The number she settles on as a minimum to produce the kind of "city liveliness or public life" that she has been describing, is 100 dwellings per acre (24,700 dwellings per sq km). "As a general rule," she adds, "100 dwellings per acre will be found to be too low." (Jacobs, 1961)



Map 1 – Antigonish Dwellings per Acre, 2006. The darkest blue areas represent densities of 5-11 dwellings per acre. The intermediate blue areas represent densities of 1-5 dwellings per acre.¹

Jacobs was clear that her analysis of the value of high-density mixed-use areas applied to *great* American cities and that the dynamics of towns and small cities were quite different. Despite the fact that Antigonish boasts a population density that is high (over 1,000 per sq km) relative to other small towns, it is an order of magnitude less than Jacobs's benchmark. The pockets of high density in Antigonish have between 5 and 11 dwellings per acre. None of these are in mixed-use areas such as Main Street. In addition, of course, none of them lie next to great city districts that can provide a flow of pedestrians moving into and through them. The only way that small towns like Antigonish can benefit from non-residents on their streets is if these people travel in from surrounding areas and beyond at distances that it is impossible to walk.

Rural planners in North America have, since the early 20th century, advocated more dense rural settlement focused on town centres. They represent a neo-traditionalist school influenced by the Garden City movement and harkening back to idealized notions of the English country village. However, as early as 1915 the brilliant rural sociologist Charles Galpin recognized how modern means of transportation and communications were transforming rural social networks so that "community" could develop independently of physically concentrated settlements. As farmers became more market dependent they relied less on the things they could provide for themselves on the land – homespun cloth, rustic furniture, locally forged tools, and even home-grown food. Increasingly they sold specialized commodities and bought imported and manufactured goods. Their dwellings

¹ Calculated from the NS Civic Address file for 2006. An important difference from other density calculations is that student residences contribute little to the result since each residence counts as 1 dwelling. The settings in ArcView 9.1 were: no search field (i.e. to count rather than total point values), a search radius of 200 m, kernel densities, acres as area units and output cell size of 10.

were dispersed across the countryside, but their ongoing exchanges with others involved frequent trips back and forth from town, often different towns for different purposes, across country to community halls and so on. These were communities of motion, not of static location; and since they bridged country and town, rural and urban, Galpin invented a hybrid term "rurban" to describe them.

Long and medium distance transportation and communication links are crucial in shaping 21st century Antigonish. However, there are two features of Antigonish county that make it less dispersed and dynamic than Galpin's rurban vision. First, there are few land-based occupations in Antigonish County. At one time farms were scattered across most of the county. Those areas are now uninhabited and have reverted to forest and industrial forest harvesting. Farmers, fishers, forestry workers and miners make up only 11%² of the employed population of the county. The second change is that an even smaller percentage needs to live close to land-based operations. My neighbour who is a lobster fisher lives in Lanark, far from the water. Come lobster season he, like many others, trucks his boat 15 km to Cribbon's wharf. No-one in forestry could make a living from the woodlot adjacent to their home. Instead they drive to contracts in all directions in the county and beyond. For this the most central location would be downtown Antigonish. Pulp contractors live in the county not to be close to their work, but because they need cheap land to park heavy equipment on.

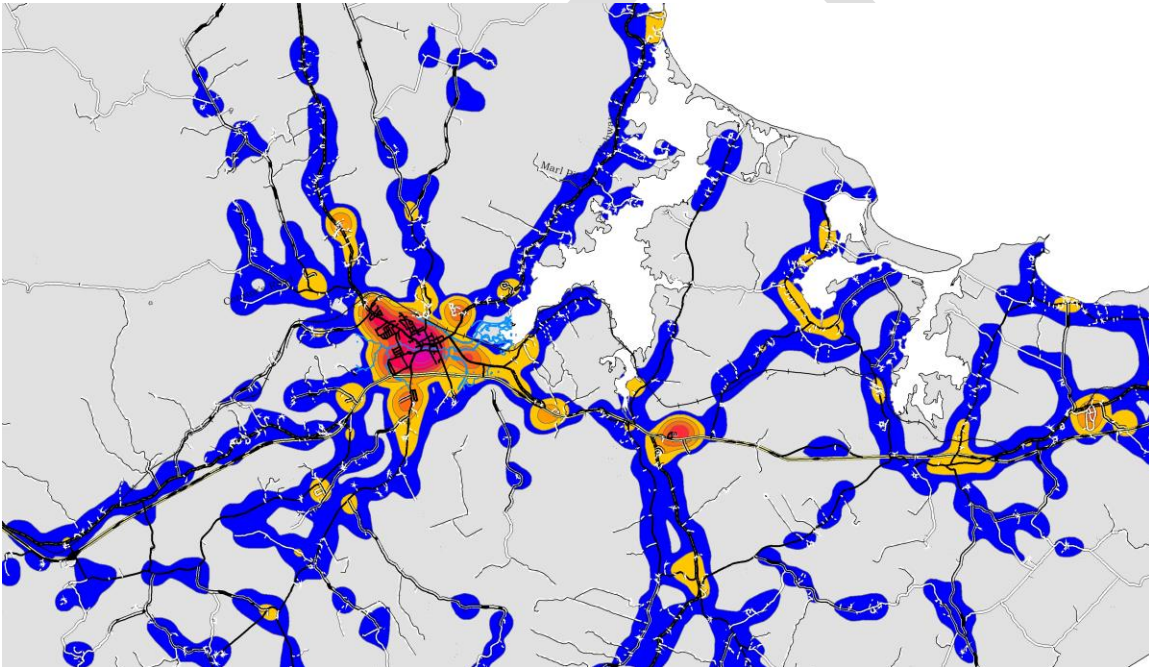
Most people who live in the county do so as a lifestyle choice and not because their work ties them to rural places. Like suburban dwellers everywhere, we like to *imagine* that county residences are rural, when in practice they are rather a bedroom community for the town. The University, one of the major employers located in the town, draws 63% of its employees from the county. The majority of the population lives in the county, but the majority of the jobs in offices, the hospital and retail outlets are located in the town and the town fringe. So the pattern of relying on commuters evident for the University likely applies to other town employers. Professors are slightly more likely³ than other University staff to live in town, but this does not reflect any dramatic town-county difference in class or culture. There is no significant difference between town and county in the proportion of people in those occupational categories with greater social power and prestige: managerial, business and finance or natural and applied sciences.⁴

² This is the 2006 census figure for occupations unique to primary industry for Census subdivisions Antigonish County A and B. The figure for the town is 6%. These are figures for individuals. Since many households are dual income, the question of whether the dwelling is located close to work is more complex. In a farm household, the wife may work at the hospital and bring in over half of the household income. There is no way of telling how many households have two income earners in primary industry, but it will (notwithstanding gay couples) be less than the number of women in primary industry: 5% in the county and 2% in the town.

³ These figures represent distance driven to campus: less than 3km is considered "town" 3 km or more is "county." 31% of faculty and 24% of staff live less than 3 km from campus.

⁴ The 2006 figures are: Management occupations – 8% of town, 7% of county; Business; finance and administration occupations – 13% of town, 14% of county; Natural and applied sciences and related occupations – 4% of town, 5% of county.

Most county residents also live within well-defined transportation corridors – on roads that are paved and high on the priority list for winter ploughing – to facilitate the daily commute. The result is that the physical geography of work, residence and travel is not as abstract and fragmented as in Galpin's rural model, and can be represented as a more or less continuous area on a map (see Map 2). The residential areas of the county extend the town outward in the pattern of a ragged star. It is not proper to call this area "rural" in the traditional sense or even "rurban" in Galpin's sense; rather, it is a suburban extension of Antigonish town. Depending on which direction they look, residents of the outer suburbs will see low-density residential development or views of industrial forestry, industrial agriculture or the occasional small industry – an electrical repair shop, an auto body shop, a gravel pit. Some, not unlike privileged residents of great cities such as Vancouver or San Francisco, have a view of the ocean. True, a few farm households are contained within this suburb, but that was also true of Antigonish village over 100 years ago.⁵



Map 2 – Suburban Antigonish, 2006. Suburban Antigonish (not fully represented here) encompasses an area of 293 sq. km (20% of the county) and has a population of 20,126 and a population density of 69 people per sq km.⁶ The remainder of the county is virtually uninhabited.

Residents of the suburb depend on the town. Those who are employed in town must make daily trips in. All of them have to make regular trips in to shop for groceries, to

⁵ In 1891 11% of the employed residents of Antigonish village listed their occupation as "farmer;" this is exactly the same percentage of 2006 employed residents in the *county* who listed their occupation as one unique to primary industry (so somewhat less than 11% of these would be farmers).

⁶ Since people are not spread like butter across the landscape, all calculations of population density capture empty space between and around people (in this case dwellings full of people). This map captures more than others in this report, because the "search tolerance" is set wider, at 300 rather than 200 metres. Separate areas that contained fewer than 4 dwellings, even though they met the minimum density requirements, were excluded from this map.

visit the pharmacy, to see their doctor, to go to the bar or liquor store, to see a play or visit an art gallery. With the exception of a handful of convenience stores, none of these things exist outside the town and its immediate fringe area. Conversely, the town needs the suburb. Town vitality depends upon traffic from the suburbs and beyond – either from neighbouring towns or from tourists, students and other visitors who come from afar. In this the town is not different from districts in great cities that depend upon through traffic from surrounding districts for their vitality. The difference is in how people get there.

In the high-density areas described by Jacobs people walk from surrounding districts, or they come by subway. Subway stations create perfect “nodes” for high-density mixed-use development in cities because they are hubs of pedestrian traffic. They disgorge large numbers of people onto the streets from an underground transportation infrastructure that does not compete for space on the surface. However, when people arrive by car (and this is true of cities as well as small towns) they rely on a form of infrastructure – highways, freeways and parking lots – that is very greedy for space. Cities that rely on the private automobile to move traffic (planners call this “automobility”) undermine the density that is the other guarantee of the vitality of their streets (for an illustration, look at downtown Houston, Texas on Google Earth).⁷ Cities do not need to rely on automobiles since they have sufficient ridership to make a variety of public transit options viable. Small towns have fewer options since the extremely low densities of their surrounding suburbs make any form of public transport very difficult, but perhaps not impossible to support.

The current transportation model creates a dilemma for small town development. Out-of-town traffic is necessary for town vitality, but when it comes in by car it undermines the density and pedestrian traffic which is the other guarantee of town vitality. North American towns typically solve this dilemma at the expense of core density, pedestrian traffic and the livability of the town core. Antigonish faces strong pressures in this direction and many, particularly residents and businesses located in the town core, but also many in the surrounding area, have struggled against them.

THE SPREAD OF HIGHWAY COMMERCIAL

Main Street Antigonish remains an attractive place for pedestrians. It is lined with buildings of two or more stories of various ages and designs that give visual variety to the street. A mix of specialty retailers, offices, restaurants, churches, theatres, bars and a scattering of second floor apartments give people varied reasons to be on the street. There are numerous places to sit and watch people go by from street side cafes or barbershop windows. On-street parking provides a buffer from traffic for pedestrians who also enjoy wide walkways flanked by storefronts with windows at street level. (As you walk west past the Legion, this pattern changes along the south side – the parking lots for Dooley’s and Shoppers Drug Mart and the blank building fronts make this portion of the walk seem a little less lively.) The street is gently curved, slowing traffic and

⁷ For more on the dynamics of automobility in large cities see (Raad and Kenworthy, 1998).

varying the visual prospect for drivers and pedestrians alike. Blocks are long with buildings mostly tightly spaced along them, however there are numerous narrow passageways that allow pedestrians to filter through from parking areas behind the street to the south and north. On summer evenings this is a place where people can be found simply out for a walk and can expect to mingle and chat with friends and neighbours.



Photo 1. Main Street Antigonish, June 13, 2008.

Of all the streets you have imagined living on, would you rate this among:

Worst below average average above average best

If you were exploring on foot, and turned onto this street, how tempted would you be to walk down it:

Strongly repelled repelled neutral attracted strongly attracted

The Trans Canada highway was built in the early 60s along what is now the southern town boundary in order to allow through traffic to bypass Main Street. James Street, once the main road, became the first exit into Antigonish off the highway (going east). Close enough to capture car traffic from both the highway and the town, but far enough from the town core to benefit from low property values, it became an ideal site for "highway commercial" development. More accurately, James Street has evolved into an odd hybrid of highway commercial and a town street. Buildings are predominantly single story with ample parking areas separating them from each other and from the street. There is no on-street parking and few trees. Its sidewalks are flanked by parking lots to which cars have uncontrolled access so that pedestrians have to contend with them constantly crossing their path. Despite some attractive planting and landscaping, the

main visual impact is of large plastic signs for generic fast food outlets. Still there are numerous apartments in and among the commercial buildings, perhaps in part because the whole strip is within walking distance of the University.



Photo 2. James Street Antigonish, June 19, 2008.

Of all the streets you have imagined living on, would you rate this among:

Worst below average average above average best

If you were exploring on foot, and turned onto this street, how tempted would you be to walk down it:

Strongly repelled repelled neutral attracted strongly attracted

In 1974 the town's first mall was built just off the third (Church Street) exit into town. The mall is located at the far end of a vast and forever underutilized parking lot, which it currently shares with a motel, Boston Pizza, and a plaza housing the town's only liquor store, plus a grocery and assorted businesses. The mall houses a diversity of retail and services, including doctor's and dentists offices. Its main virtue is that it provides a kind of indoor street completely given over to pedestrian traffic. The pedestrian concourse is wide, has numerous benches, and a "sidewalk café" that make it comfortable to stroll or sit and chat in a quasi-public space even in winter. The whole development is however, difficult to walk to. Despite the welcome addition of trees recently, the approach is bleak, barren and exposed to the weather – particularly winter winds (see Photo 3). With the exception of students, who have more or less direct access from campus through a gravel path they call "liquor lane," people drive to the mall.



Photo 3. Entrance to Antigonish Mall, February 9, 2007. Note that there are actually a couple of pedestrians on the sidewalk, one of them carrying grocery bags.

Of all the streets you have imagined living on, would you rate this among:

Worst below average average above average best

If you were exploring on foot, and turned onto this street, how tempted would you be to walk down it:

Strongly repelled repelled neutral attracted strongly attracted

During the period between 1996 and the present there have been a number of changes that have shifted the retail and service focus of the town from Main Street to the highway. The County Council relocated its municipal office from the town to Beech Hill Road in an isolated spot south of the highway and impossible to reach by foot. The provincial Natural Resources Department also relocated to Beech Hill from James Street. Eastern Auto which moved from Main Street, and a new dealer Strait-Way Kia Motors both built on hillsides to display their car lots to the highway from a good distance. Kia now marks the furthest extent of highway commercial development 3 km east of the first exit to Antigonish. At some point after 2000 Loblaws acquired the last grocery store in downtown Antigonish which it renamed the Save-Easy. It had recently built a "big box" grocery store, "Supervalu," south of the highway 3 km from the town centre at a site that soon attracted additional big box development – a home improvement store, a Wal-Mart, a Superstore (which replaced the short-lived Supervalu) and Staples Office supplies.

In what was to prove a cruel irony, Loblaws management had a mural painted behind the produce section depicting a small town market street. However the big box development that it became a part of is completely antithetical to street life. Unlike Antigonish Mall there is no indoor pedestrian concourse; neither are there any sidewalks or safe corridors for pedestrians in the vast parking complex. There are also no sidewalks from the town to this development. Still, amazingly, many students still walk to it from campus. A student account of the experience is worth quoting at length.

On Tuesday January 23rd I walked to Wal-Mart and am very familiar with the walk along the highway because I use to live on Sommers Rd. In the summer months the blowing dust from the vehicles and transfer trucks makes it very hard to breath. I am afraid that debris or rocks will fly up and hit me (ha ha)! The shoulder of the highway is very narrow and dangerous. There are two gas stations ...along the way that also stink and vehicles often fly into them not really noticing if anyone is walking through. There is a footpath that does begin directly after the 2nd gas station that is mega narrow. I would recommend sidewalks a good distance away from the highway. The wait at the lights to get to Superstore and Wal-Mart is amazingly long. And there is nothing appealing about the area of the 2 stores. Its all pavement and parking ... I rate the walk to Wal-Mart a -10 [i.e. minus ten out of ten].



Photo 4. The Walk to Superstore, June 19, 2008.

Of all the streets you have imagined living on, would you rate this among:

Worst below average average above average best

If you were exploring on foot, and turned onto this street, how tempted would you be to walk down it:

Strongly repelled repelled neutral attracted strongly attracted

After a very brief period of operating the Save-Easy, Loblaws closed it and placed a conditionality on the sale of the downtown building that it never be reopened as a grocery. So from this point (about 2003) on, anyone who wanted to shop at a full-service grocery had to go out to the highway. Students can grit their teeth and walk, but old people and low income families are forced to drive or take taxis where it should be possible in a small town to walk.

At its most financially successful, highway commercial development creates bland and generic landscapes of multilane asphalt, parking lots, fast food outlets and big box retail in which enormous signs vie for visual space with traffic lights and power poles. It can be dynamic and colourful, but erases any sense of uniqueness in a place, making it identical to any other strip development in North America. At its worst it is hideous and dispiriting. In all cases it is repulsive in the sense that it tends to repel other uses. Unless a person is driving and needs to fuel up quickly with gas or food, or load up on cheap goods, highway commercial development has no other attraction. People do not dream of living in such places, nor are they drawn there to walk, jog, roller blade or to pass the time of day with others.

Currently 1 sq km of land along the Trans Canada highway as it runs past Antigonish is zoned industrial, commercial or highway commercial (Municipality of the County of Antigonish, 1996). These zones are fragmented along the route and because of the long views of the highway corridor, the visual impact takes up 14 km from Kia Motors in the west to Glen Aire mobile home park in the east. The proposed twinned highway bypass, due to be built in 2011 parallels this stretch from end to end. It will skirt existing commercial developments and transform 2.3 sq kms of existing fields and woods into multilane asphalt on a raised roadbed. It will cut off the residential development at Greenhill from the rest of the town. While Greenhill is within walking and biking distance from town, major highway overpasses tend to deter this sort of traffic. The new bypass will clip Silver Birch mobile home park to the south, and then swing over top of the existing highway to clip Glen Aire mobile home park from the north. Both of these high-density, low-income housing developments will become sandwiched between major highways. These, along with the whole highway-flanked corridor (5.5 square km, an area larger than the Town) will become less attractive places to live. Low-intensity highway commercial is likely to spread along the existing Trans Canada outward from each of the three new exits from the bypass.



Photo 5 – Approach to Antigonish, June 20, 2008. This is a view from the Trans Canada Highway looking east. The spot is about half way between the new big box development and the first exit into Antigonish. People both walk and live on this section of highway.

Of all the streets you have imagined living on, would you rate this among:

Worst below average average above average best

If you were exploring on foot, and turned onto this street, how tempted would you be to walk down it:

Strongly repelled repelled neutral attracted strongly attracted

Highway commercial developments are lucrative because they can draw automobile traffic from a large radius and accommodate it in ample parking lots. Lower rents and economies of scale mean that retailers can often out-compete Main Street businesses and undermine the commercial viability of the downtown. Since all of the potential for this sort of development discussed so far exists beyond the legal Town boundaries under County jurisdiction, the County has an economic interest in promoting it at the expense of the Town, since it will increase County tax revenue. Powerful as the incentives for this sort of development are, it has some built-in contradictions. A landscape that looks like everywhere else and nowhere in particular, does not in fact attract tourists. What we are constructing along the main tourist route is a loud advertisement that this is a place to gas up, grab a burger and go. Tourists who come to Nova Scotia are looking for rural place images – scenes of natural beauty, fields and farms, fishing villages, and towns that retain some of the flavour of a 19th century village. These sorts of “lifestyle values” are also critically important for attracting and retaining highly qualified personnel required by the University, the hospital as well as innovators who realize that in the “new economy” it is often possible to choose where to live first and how to make a living

second. (Antigonish competes with places like Wolfville for the "rusticator professional" segment of what Richard Florida (2005) calls the "creative class.")

E. P. Relph, in his diagnosis of what he calls "placeness," points out that it can undermine even local people's sense of the uniqueness of the place that they find themselves, replacing it with the idea that they inhabit a place of no importance, bypassed on the route to somewhere else. (Relph, 1976) When young people here use the term "Anti-go-nowhere," this is partly what they mean. The more the town becomes defined by its commercial periphery, and the less it offers a walkable, vital core, the less reason there is for people to choose to live there. Instead they seek out "rural" properties in the county. Once they need to drive in every day, the need for parking is increased and the dynamic becomes self-reinforcing.

There are centrifugal forces driving residential development out into the county. But at this end there are new contractions. The ideal location for a "rural retreat" is close to town, on a paved road and as far as possible from other residential rural retreats so that one has unobstructed views, whether of farmland, forests or waterfront. Over time, as more people seek the same thing, "as far as possible" becomes closer and closer and the transportation corridor slowly becomes in-filled with residences as close as their septic systems will allow. What once looked rural now looks like a residential development that has lost the scenic benefits of the rural and not gained the density benefits of the urban. Residents are increasingly mounting opposition to "subdivisions" which they see as compromising the "rural" character of the County. However, a well-designed subdivision that concentrated dwellings and contained, as part of the development, large open spaces would look far more "rural" than what people are currently constructing in piecemeal fashion.

SUBURBAN SPRAWL AND SUSTAINABILITY

Car dependence and suburban sprawl can make any place less liveable. The costs to the visual amenities of the landscape are particular to areas like Antigonish, that depend on rural place-images to market themselves to highly skilled personnel, investors, tourists and "summer residents." The growing concern of Antigonishers with the direction of local development is not just economic however; it is also social and environmental. One of the first of a series of recent initiatives dealt with issues of social justice and inclusion. In response to the closure of the Save Easy, Antigonish citizens formed VOICES to advocate for solutions that would provide "fresh, locally produced food ... in downtown Antigonish." (Huffman) Citizens concerned about the visual and ecological impact of residential subdivisions on Antigonish Harbour recently organized a large public forum on the "Future of Antigonish Harbour." Plans are underway to form a community-based "Antigonish Harbour Watershed Association" as a spin-off of that community concern.

Antigonish citizens have also put together a very ambitious planning and development partnership. The Antigonish Area Partnership (AAP) styles itself as a not-for-profit "business alliance of the public and private sectors." In 2005 it sponsored a community-

wide visioning exercise. Contributors to that planning exercise, like the members of VOICES, emphasised issues of social justice and inclusion, advocating for residential development "more affordable housing; rent control in place; better housing conditions for students, families and seniors" as well as "a public transit system" that would allow "housing options elsewhere than Town." (Antigonish 2020 Foresight). More than one committee that contributed to the report repeated this recommendation for some form of public transit using small shuttle busses to serve the town and link the town to the most populated suburban routes. The Quality of Life Committee saw it as a public health issue, arguing, rightly that "a public transit system ... will lead to less reliance on the automobile, increased pedestrian activity and, therefore, increased **health**."⁸ (Antigonish 2020 Foresight).

Contributors to this visioning process also spoke strongly about their desire to be part of a community that was working towards environmental sustainability. They provided a community mandate for the formation of the Antigonish Sustainable Development Project (ASDP) in 2007. Business, NGO and government partners have committed to a set of sustainability principles including the "triple bottom line." What that means is that they evaluate practices and policies in light of social and environmental as well as economic costs and benefits. In their founding document, they also make a commitment to linking actions to outcomes by using clear quantifiable measures of progress. This report is a response to that community demand.

Mitigating and adapting to climate change will be the defining environmental challenge of the 21st century. Antigonishers are looking into alternative energy sources (Grant, 2006) and many are switching to energy-efficient vehicles and advocating a modal shift from cars to public transit to bikes to walking. This is all good, but the fundamental energy-inefficiency we need to tackle is in how we lay out our cities, towns and suburbs. Compared to the great city districts described by Jane Jacobs, with over 100 dwellings per acre, sprawling auto-dependent suburbs consume vastly more useable land area, asphalt, concrete, gravel, sewer pipe, electrical lines, and power poles, per person, to build and maintain. In addition, the ongoing movement of residents to services, or services (like ambulance, garbage collection or fire rescue) to residents, covers greater distances and uses more fossil fuels per person. The average North American suburb with, according to Jane Jacobs, 5 to as many as 10 dwellings per acre, is one of the most energy-inefficient living arrangements in human history.⁹ Suburban Antigonish, with 0.12 dwellings per acre (29 dwellings per sq km), is dramatically less efficient than that. The very low-density suburban structure of much of Antigonish is the main cause of our high carbon footprint.

The Union of Nova Scotia Municipalities has encouraged local governments to make the connection between urban form and rising greenhouse gas emissions, advising smaller municipalities, ...to try to prevent, 'ribbon' development when construction occurs only on a narrow strip along both sides of an existing

⁸ There is strong epidemiological evidence of a connection between suburban sprawl, automobile dependence and rising obesity levels, see (Lopez, 2004).

⁹ For more on this theme see (Shore, 2006).

roadway. Higher density, 'cluster' development is easier and less expensive to provide municipal services and encourages the development of nearby commercial businesses to service the nearby residents. New developments should also try to incorporate trails for cyclists and pedestrians to offer people a non-motorized means of travelling through the municipality." (Union of Nova Scotia Municipalities, 2005)

The Town of Antigonish has worked hard to maintain its core density and the viability of its Main Street businesses to ensure a full range of retail and other services within a walkable core. To be truly effective in this it would have to have control over the entire suburban system of which it is a part. The County's experience with urban planning is very recent and so far it has shown no commitment to the principles advocated by the Union of Nova Scotia Municipalities. The County's commitment to co-operation is also weak. The Town was an early supporter of the Antigonish Sustainable Development Project; the County, despite pressure from citizens and provincial officials chose to withdraw from it.

MEASURES FOR SUSTAINABILITY

This report is intended to be a baseline analysis for evaluating changes in the built environment in Antigonish County. I also describe changes that have occurred between the census years of 1996 and 2006. My intent is to provide quantified measures as much as possible, but these can often be meaningless without the interpretation as well as qualitative description that I have already offered in the first two sections. There are three areas of description that I am interested in: 1) the geography of residential development, with particular attention to its extent and density; 2) the geography of commercial development and 3) travel requirements conditioned by the first two.

Using the Nova Scotia Civic Address File (NSCAF) I have been able to model building locations and population densities in a much more detailed and precise way than is possible using StatsCan figures alone. Using ArcGIS software I have also been able to calculate exact distances between addresses, households, businesses, etc. The distances are measured by road, with preferences given to paved routes (it assumes that someone from Georgeville will not travel down the Glebe Road and the Beaver Road to get to Antigonish, even though this is the shorter route).

The basic measures I use are residential density and an index of proximity to amenities. I have represented residential densities using two simple categories – high density (over 1,000 people per sq km) and low density (fewer than 1,000 people per sq km). I have also created an index of the proximity of dwellings to amenities that householders would have to travel to on a regular basis. The trip to work would have been ideal, but without an extensive survey that information is not available. Instead I took four trip purposes – buying groceries, seeing the doctor, going to the pharmacy and (a very popular purpose locally) going out to the bar or picking up booze at the liquor store – and, for every household in the county, calculated the shortest distance to carry out each one. I then calculated the total distance to do all four sequentially.

The change between 1996 and 2006 is represented in the following two maps.

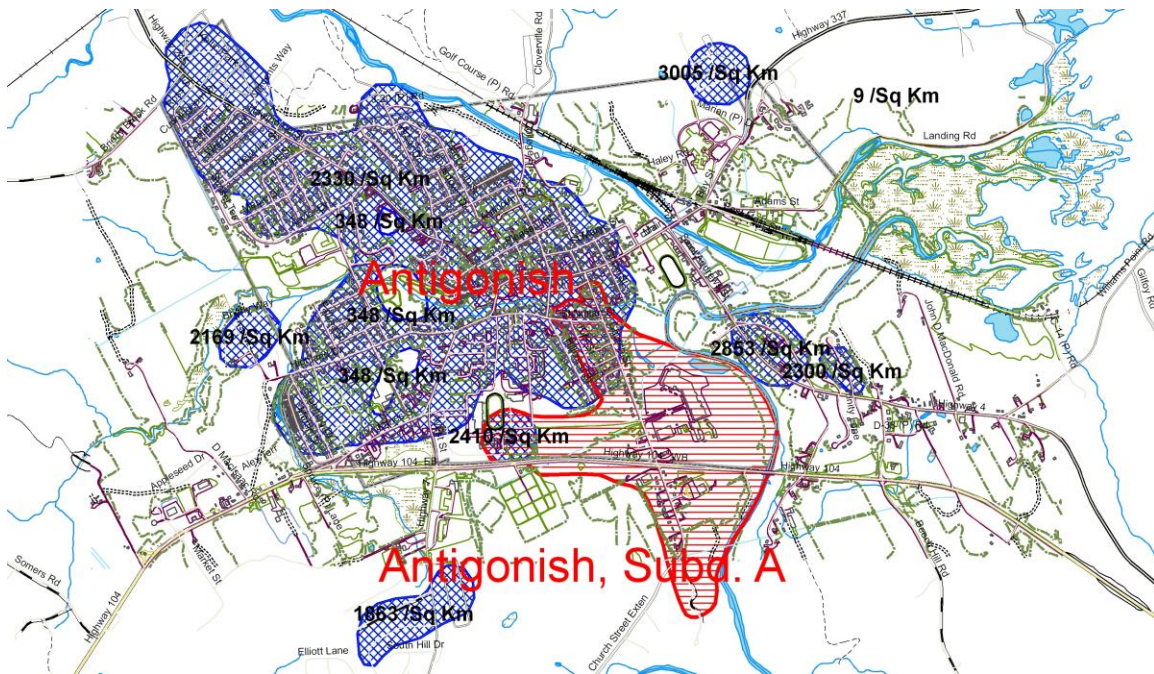


Map 3 – Density and Walkability, 1996.

The 1996 map represents high population densities in green crosshatching (with people per sq km indicated in black letters). The area outlined in red represents all those households for which the index of proximity was less than or equal to 3 km. This number is arbitrary, but since the area it describes is about a 10 to 15 minute walk from periphery to centre, it seemed reasonable to call this a “walkable” area.¹⁰ Within the red line, households are within walking distance of all four amenities.

By 2006 the walkable area has shifted its focus to the Antigonish Mall. After the closure of the Save Easy, Sobeys in the mall becomes the closest grocery to downtown. The walkable area now encompasses much of the highway and the flood plain behind the mall where people do not live. With the barrier that the Trans Canada highway poses to pedestrians, it is questionable how walkable it is from the Church Street Extension south of the highway. What is meaningful in terms of walkability is the walkable area that overlaps areas of high density. That can be represented in a single number: it drops from 2 sq km in 1996 down to 0.2 sq km in 2006. This is clearly a move away from sustainability.

¹⁰ A five-minute radius would be a more convenient walking distance, and one that is often used in planning literature, but it is probably too high a standard for a low-density area like Antigonish.



Map 4 – Density and Walkability, 2006

However the total high-density area in Town and County increased slightly over the same period, from 2.9 to 3.2 sq km. Within the Town boundaries this expansion was due to the building of apartments at the south end of The Heights and on James and to a lesser extent Main Street. Also the addition two new student residences, Powers and Sommers Halls, expanded the high-density area further on to campus near the end of James Street. In the County expansion took place in Crocket Court, and mobile home parks at Greenhill, represented at the bottom of Map 4 and Oasis, Silver Birch and Glen Aire off the map to the east on the Trans Canada Highway. Increased overall size of the high-density area is a positive trend for sustainability.

While the high-density area has expanded, the average density of this high-density area declined slightly from 2,455 people per sq km to 2,333 people per sq km. Students, who have increased in number¹¹ and who tend to live in the high-density core area, mitigate this trend. Declining density among the rest of the population reflects smaller household sizes (i.e. the number of people living together). In Antigonish, (the student population excepted) more houses are being built to house fewer people. This is a trend away from sustainability.

The contrast in proximity to amenities between high and low-density areas is understandably quite striking. In 1996 the index of proximity in the high-density areas was 3.7 km, while the index for the rest of the county was 21.8 km.¹² By 2006 the index

¹¹ Non-local students (i.e. those who would not otherwise appear in StatsCan figures for Antigonish Town and County) increased from 2,560 on Sept 1, 1995 to 3,725 on Oct 1, 2005. These figures refer to full-time undergraduates (StFX Registrar, June, 2008)

¹² This is an index only. It measures the distance to travel from each household to four different amenities (a grocery store, a pharmacy, a doctor's office, clinic or hospital and a liquor store or bar) sequentially.

had increased to 5.3 km for the high-density areas. This reflects the changing geography of retail and services (i.e. the shift to the highway) as well as the changing shape of the high-density areas which have grown in the so-called Antigonish fringe (i.e. outside the Town boundaries) and in mobile home parks such as Greenhill (2.1 km), Silver Birch (4.7 km), Oasis (4.8 km) and Glen Aire (8.8 km) often at considerable distances from the town centre. The growing index of proximity for high-density areas is a trend away from sustainability.

The trend for low-density areas is also one of increase from an index of 21.8 km to 22.2. The reasons for this are unclear, since in theory moving amenities out to the highway should provide greater convenience to everyone in suburban Antigonish except those who live to the north of the town centre (who must thread through the town before getting out to the highway). To get at the other side of this dynamic – the changing location of dwellings in the suburb rather than the changing location of amenities – we can use a simpler measure of the distance from the centre of town. In 1996 the average distance to the town centre was 13.6 km. The fact that housing estates, mainly mobile home parks, have grown up within a 9 km radius since then helps to explain why the average distance to the town centre in 2006 had dropped slightly to 13.3 km. This is a positive trend in terms of sustainability.

The distances are measured by road, with preferences given to paved routes (so someone from Georgeville will not travel down the Glebe Road and the Beaver Road to get to Antigonish, even though this is the shorter route). To capture the possibility that people living near the borders of the County travel to adjacent counties to shop (e.g. in New Glasgow, Port Hawksbury or Guysborough), the road networks to and amenities in the adjacent counties was also modelled on the map. ArcView 9.1 was not able to optimize the route (i.e. if the closest amenities to a particular household are not clustered together the route may involve some doubling back and the index will be inflated). The distance calculated does not involve returning to the household.



Photo 6 – Glen Aire Estates, February 8th, 2007. (Photo credit: Colleen Turlo.) This is clearly a street designed for driving. It is worth contrasting it to James Street (photo 2) in this regard.

Of all the streets you have imagined living on, would you rate this among:

Worst below average average above average best

If you were exploring on foot, and turned onto this street, how tempted would you be to walk down it:

Strongly repelled repelled neutral attracted strongly attracted

The fact that the growing mobile home parks contribute to this trend is interesting, but hardly qualifies them as sustainable solutions to low-income housing. As currently designed, they condemn those who can least afford it to extensive driving. There are virtually no amenities within walking distance of these housing developments, and so residents must own at least one vehicle to access work, shopping and recreation. If couples have separate jobs, or stay-at-home partners are not to become trapped during the workday, families should operate more than one vehicle. Low-income housing should either be located within the walkable core of town or be linked to it by public transit. As high-density residential nodes, mobile home parks would be ideal stops on a public transit route.

The virtues of measuring travel distances the way I have is that it uses a total sample and the NSCAF data that it is based on is released for free by the Nova Scotia government. It can easily be updated to provide ongoing progress reports, say every 5 years. The main limitation is that it only gives us minimum possible distances. There are all kinds of reasons for people to travel further for their groceries, doctor, entertainment etc. It also

does not include the most important regular travel destination, which is to work. A sample survey would be very useful to fill in these gaps, at least for one benchmark year.

Walkability could also be better modelled using GIS data. The places where people are willing or able to walk are different from the places where cars go (which is what I am currently modelling). If walks are too unpleasant, too steep, too dangerous, people are not likely to use them. These sorts of "impedances" can also be modelled in GIS, along with measured average walking times, to create a planning tool for improving walkability. Important here would be creating both winter and summer models. A similar thing could be done for cycling routes. For cycling, the emphasis should not be so much on recreation, but on daily use (e.g. how easy is it to cycle to campus). There is no reason why biking trails should not extent a good 10 km out from the centre of town along all the major suburban routes. The existing data I have created would already be useful for planning public transit routes.

In my description of the changing commercial landscape, I have used some quantified measures. There are additional measures that could be useful for both auditing and planning further commercial development. One is the total area of single-use commercial and dedicated transport infrastructure, including roadbed and parking. Measures of parking intensity (percentage of area devoted to off-street parking) or overcapacity (an audit of unused parking space) would be telling indexes of auto dependency.

View planes could be modelled in ArcGIS as a tool for meaningful zoning. The point of zoning is not just to separate, but to buffer incompatible land uses. Residential areas should incorporate high-density mixed use, but be visually buffered from sprawling, single-use highway commercial and industrial developments. In suburban Antigonish, this could apply also to certain types of industrial forestry (so, only selective harvesting, rather than clear cutting within a visible "beauty strip") or industrial agriculture, such as intensive hog operations. For the main tourist routes a similar principle could be applied: less visual impact of highway commercial, industrial as well as residential sprawl.

There are additional measures that could help in planning future development in suburban Antigonish. Existing development follows transportation corridors which in turn tend to follow river valleys containing the best agricultural soils. While only 9% of soils in Antigonish County are very good for farming,¹³ half of this area of good farmland is located within the boundaries of the town and its extended suburbs. We do not know how much of this has been built on, but the Department of Natural Resources Ecological Land Classification layer could be used to identify and perhaps preserve the best land as open space, set aside for agriculture. Preserving open space and concentrating further residential development in "nodes" serves a number of sustainability objectives. Preserved open space is also a visual amenity – the "rural" character of which

¹³ These are soils classified as "good" and "good to fair" in the 1954 soil survey of Nova Scotia. These are not the only soils that can be farmed; however, the other categories, "fair" and "fair to poor" would be limited in the range of crops they could grow (e.g. blueberries). To arrive at these land areas, the soil map for Antigonish County was adjusted using more recent and detailed mapping of "Ecological Land Classifications."

Antigonishers are rightly proud. Concentrated dwellings can be more efficiently serviced – with for example shared sewer or water systems. This pattern is difficult to quantify, but easy to represent. The following maps represent different planning scenarios for a rural subdivision as conceived by the planner Randall Arendt. (Arendt, et. al., 1999)

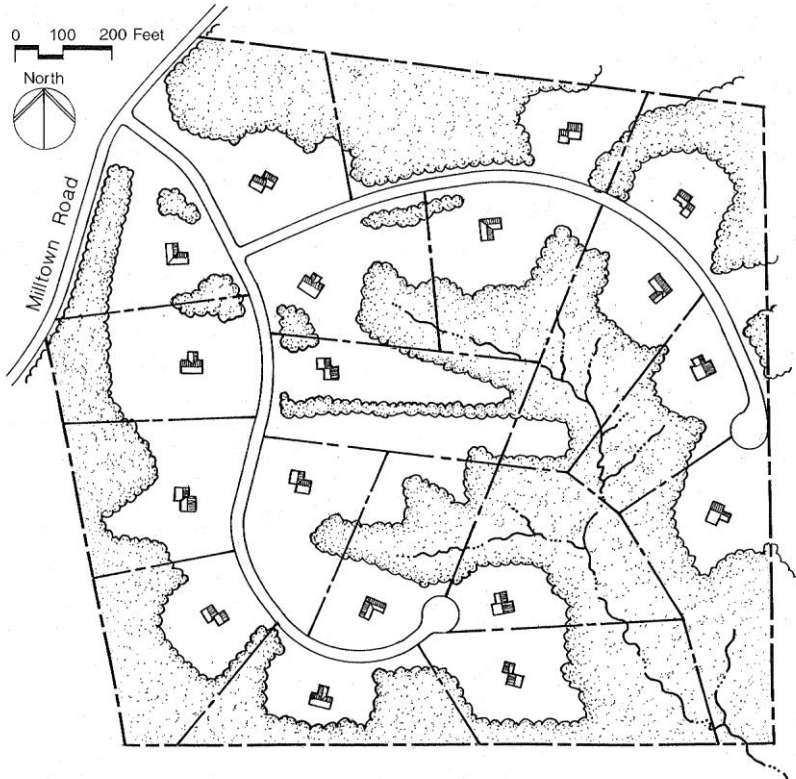


Figure 4-2. CONVENTIONAL LAYOUT AT PREEXISTING DENSITY.

Minimum lot size:	80,000 square feet
Overall density:	One dwelling per 80,000 square feet adjusted tract acreage
Lot yield:	18 lots
Conservation land:	None
Lot size range	
Minimum:	80,000 square feet (1.8 acres)
Typical:	80,000 square feet (1.8 acres)
Maximum:	None

Arendt constructs five alternative options, each of which allows for greater residential density and/or more preserved open space. I have reproduced option 2 below.

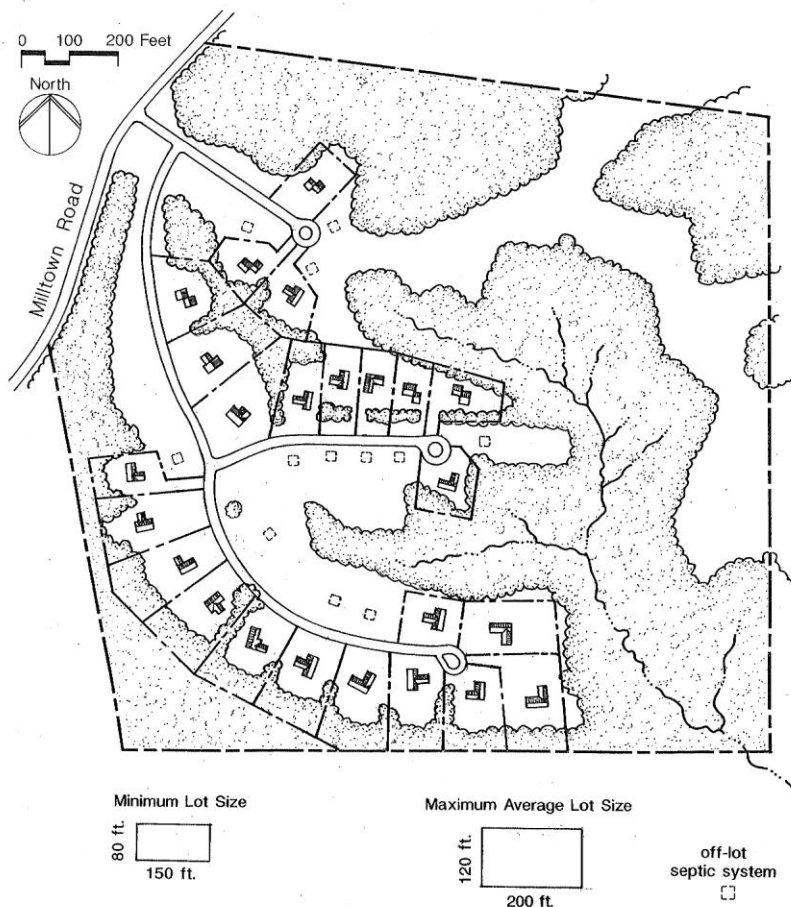


Figure 4-4. OPTION 2: ENHANCED CONSERVATION AND DENSITY.

Maximum density:	One dwelling per 60,000 square feet adjusted tract acreage
Lot yield:	24 lots (maximum)
Conservation land:	60 percent (minimum) of adjusted tract acreage
Lot size range	
Minimum:	12,000 square feet (0.28 acres)
Typical:	18,000 square feet (0.41 acres)
Maximum:	24,000 square feet (0.55 acres), on average

Arendt's first option, which I have not reproduced here, concentrates the lots in the same way as Option 2, but has the same number of dwellings as the "conventional layout." While it preserves much more open space, it has the same overall density as the conventional option: 0.36 dwellings per acre. Simple measures of density do not capture the preservation of open space.

Note that both plans represent far greater densities than exist in suburban Antigonish. The "conventional layout" is 0.36, Option 2 is 0.48 and suburban Antigonish is 0.12 dwellings per acre. Both are also more efficient than what the Union of Nova Scotia Municipalities calls "ribbon development." A couple of measures might help to model the spread of ribbon development: the number of km of roadbed per dwelling; and the number of main-route access points per dwelling. Strip development results in a ratio of 1.1 where every house has a separate drive on to the main road – a layout that slows

traffic and increases the likelihood of accidents. Arendt's conventional layout would have a ratio of 18:1 and Option 2 would have a ratio of 24:1. Glen Aire Estates, incidentally has a ratio of 220:1 which is what makes it a good candidate for a public transit stop. Concentrations of residential development facilitate public transit.

CONCLUSION

The main purpose of this paper has been to contribute to a discussion about the liveability and sustainability of the built environment in Antigonish County. I have contextualized this discussion in terms of Jane Jacobs's paradigm for liveable urban spaces, and attempted to show its relevance as well as its substantial limitations when applied to a small town setting. I have also offered some quantified measures for identifying the threats to liveability and sustainability, as well as for planning workable alternatives.

Many citizens in the Antigonish area want to see change. As contributors to the Antigonish 2020 process stressed repeatedly, a critically important step would be planning co-operation between the County and Town municipalities. County planning provisions could benefit from a thoroughgoing review in light of an overall Town-County planning vision.

Reforms for sustainability and liveability can be mutually reinforcing. Antigonish cannot create the quality of great city neighbourhoods, nor can the town core rely on local foot traffic to ensure the vitality of its streets. Even with public transit and extensive bike trails, the core must continue to accommodate substantial automobile traffic from the periphery. Still, within those constraints there are enormous possibilities for creating a more attractive, vibrant and healthy place to live while at the same time reducing our overall carbon footprint.

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