Urban-Rural Edge Area Nuisance Mitigation Strategies in Kings County, Nova Scotia



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LIST OF ABBREVIATIONS

- ALC Agricultural Land Commission
- ALR Agricultural Land Reserve
- ARC Agricultural Resources Coordinator
- LUB Land Use Bylaw
- MGA Municipal Government Act
- MPS Municipal Planning Strategy
- RTF Right to Farm
- SPI Statement of Provincial Interest

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EXECUTIVE SUMMARY

Urban-rural edge areas are often scenes of conflict, where residential and agricultural uses compete for limited land. Kings County, Nova Scotia contains both the most productive and lucrative agricultural land in the province, and areas under considerable development pressures. Currently, the Municipality of Kings County lacks a comprehensive urban-rural edge planning strategy, and the municipality and province split responsibility for nuisance prevention and mitigation. This approach can lead to policy gaps and limited focus, and contributes to continued nuisance complaints and loss of productive agricultural land.

Any proposed mitigation measures must comply with Kings Countyís twin goals of preserving farmland and protecting farmers. Edge planning literature suggests design-based land use policies, and recent research supports using vegetative buffers. British Columbia offers a government guide for incorporating vegetative buffer standards into plans and policies. Some of their suggestions may be suitable for adapting to the Kings County policy and land use context.

How should the plans and policies in Kings County change in order to integrate higher standards for vegetative buffers to mitigate urban-rural land use conflicts?

Analysis suggests adopting vegetative buffers on the urban side of the urban-rural boundary may shield homeowners from some of the negative effects of farm practices, and shield farmers from the complaints associated with these nuisances. Vegetative buffers may also allow reduced setbacks between some farm types and residential areas, potentially saving productive farmland around the County's urban growth centres.

The Province and Municipality may not be keen for further regulating the urban-rural edge, but new design guidelines could potentially reduce land use conflict and preserve farmland, serving two major goals of the Kings County Municipal Planning Strategy. The two levels of government need not change their legislative framework, but rather work proactively and in close concert with one another to implement these new measures on privately owned residential land in edge areas.

Recognizing the potential for uneven buffer efficiency site-to-site and loss of some productive farmland, for administrative ease and lower demands on County resources, my final recommendation is:

- Standardizing vegetative buffer requirements in all residential lots bordering agricultural land, which would entail:
 Provincial work
- establishing a baseline vegetative buffer requirement **Municipal work**
- changing subdivision rules in the urban growth centres
- changing minimum lot sizes and building envelopes in non-farm developments in the Agricultural zone, and
- reducing setbacks requirements.

Before making these changes, the provincial and municipal governments must first jointly investigate potential costs and impacts on property ownership and development in urban growth centres, evaluate the local natural context, and implement other nuisance mitigation measures recommended in the literature.

INTRODUCTION

Urban-rural edge areas are often scenes of conflict, where residential and agricultural uses compete for limited land. Kings County, Nova Scotia contains both the most productive and lucrative agricultural land in the province, and areas under considerable development pressures. Currently, the Municipality of Kings County lacks a comprehensive urban-rural edge planning strategy, and the municipality and province split responsibility for nuisance prevention and mitigation. This approach can lead to policy gaps and limited focus, and contributes to continued nuisance complaints and loss of productive agricultural land.

Land use conflict mediation tactics often harm farmers and diminish farmland, through restricting farm operations and removing viable farmland from production. These outcomes contradict Kings County's stated goals of preserving and protecting farmers and their land. Edge planning literature suggests ameliorating some of these negative consequences with design-based land use policies. Recent research supports using vegetative buffers in nuisance mitigation. British Columbia offers a government guide for incorporating vegetative buffer standards into plans and policies that may be suitable for adapting to the Kings County policy and land use context.

Fully adopting BC's planning recommendations for mitigating nuisances would create some new problems in Kings County, however. Some of the suggested edge planning techniques and changes to authority structures may be unnecessary or counter productive, further burdening farmers and removing farmland from production.

Analysis suggests adopting vegetative buffers on the urban side of the urban-rural boundary may shield homeowners from some of the negative effects of farm practices, and shield farmers from the complaints associated with these nuisances. Vegetative buffers may also allow reduced setbacks between some farm types and residential areas, potentially saving productive farmland around the County's urban growth centres.

The scope of this research precludes analyzing all of the potential implications of new policies, such as: cost of planting buffers, potential ramifications on residential real estate values, political viability, etc. Any new policy recommendations must address these issues before anyone makes changes in the edge area plans. This research is limited to analyzing existing provincial and municipal policies' compatibility with BC's recommended changes, and evaluating proposed changes by the potential benefits and drawbacks related to nuisance mitigation and farmland and farmer protection. Farmland and farmer protection in edge areas is the highest priority for the planners and policy makers responsible for Kings County, and any proposed policies must reflect this goal.



Fig. 1: Urban Rural Edge

Research Question

How should the plans and policies in Kings County change in order to integrate higher standards for vegetative buffers to mitigate urban-rural land use conflicts?

CHALLENGES TO NOVA SCOTIA'S AGRICULTURAL LAND

Serious problems plague the future of agriculture in Nova Scotia. Competing land uses in the urban-rural edge areas create conflicts between landowners and steadily shrinking farmland area further complicates this issue.

Nova Scotia's suitable farmland is limited. Using the federal Agricultural Land Identification Program, ranking soils from 1 (no significant limitations) to 7 (no capacity for production), Nova Scotia has between 138 000 and 1.1 million hectares of active and potential agricultural land. A 2006 North American study estimates that depending on soil type and diet, approximately 0.524 hectares can feed one person for one year. Nova Scotia has between 0.147 and 1.175 hectares per person (Devaney and Maynard, 2008, p. 5), which seems to suggest ample land to feed all 936 000 people living in the province. However, no available statistics indicate how much of that land has been irretrievably lost to other development. As well, the majority of the land falls into categories 3 and 4, and require considerable inputs for intensive agriculture use (Scott, 2008, p.3). Much of this land is already at heightened risk of erosion; A 1995 study estimated 84% of Nova Scotia's land, compared to 13% of Canada's as a whole, at "Severe" risk of erosion. In addition to being "inherently weakly structured, low in soil organic matter and nutrients, and acidic," much of the land is sloped and located in high rainfall areas (Scott, 2008, p.12).



Fig 2: Nova Scotia soil quality map - Detail high quality soils

Urbanization pressures landowners to convert, often permanently and irreversibly, agricultural land to urban or industrial uses. As the demand for land in the urban fringe grows, land values begin to reflect urban rather than farm use. These two values contrast sharply; a 2006 study estimated an average annual net productive value of \$55 per hectare of Nova Scotia farmland, compared with an estimated market value of \$1394 per hectare (Scott, 2008, p.8). With farming already such a low-profit enterprise, farmers and rural landowners often sell their land to developers to finance retirement, or idle fields for want of production or expansion capital. For those who choose to stay and can afford to keep farming, the influx of suburban residents into the area means inevitable conflicts, such as nuisance complaints, vandalism and trespassing, which can threaten and restrict farming operations (Beasley and Beezley, 1995, p.7). Farmers may intensify production in a bid to maximize profit from their limited viable land, which often leads to more intense noises and odours, and thus more nuisance complaints and ill will between farming and non-farming neighbours (Beasley and Beezley, 1995, p.8).

Farming may not richly reward individual operators, but agricultural communities reap the benefits. Kings County, population 60,035 (StatsCan, 2006, e) contains the most valuable agriculture land in Nova Scotia (Agricultural Working Group, 2007, p.7). In 2005, 604 farms in Kings County reported annual revenues of \$170 million. Total farm production per capita is two and a half times the national average. Meat, poultry, fruit, and vegetable processing make up an estimated half the value in the region's manufacturing sector (Kings County MPS, 1994 s.1.1.). Agriculture supported 16, 000 jobs and contributed over \$1 billion to Nova Scotia's economy in 2005. Agriculture further supports the area's economy through agri-tourism (County of Kings Agricultural Working Group, 2007, p.7).



Farming benefits extend beyond contributions to the provincial economy. Reducing 'food miles,' capturing carbon dioxide, and protecting wildlife habitats are some of the many ecological benefits of preserving farmland. Preserving rural lifestyles and bolstering food security benefit urban and rural communities alike (Devanney and Maynard, 2008, p.9).

Instead of receiving compensation for the positive benefits the farmland provides to the nearby public, farmers must often defend the very practices necessary for farming in the area. In conflicts between residents and farmers, the farmer typically loses (Tyndall and Colletti, 2000, p.13). It falls on policy makers to address this issue, as market forces alone cannot solve these edge problems.

Nova Scotia already has much low quality land, and it needs to protect every parcel it has. Any effort to mitigate conflicts must aim to protect farmland as well. Further complicating any attempt to address this problem, Nova Scotia has one of the highest percentages (approximately 70%) in the country of privately owned land and this limits potential government control over edge areas (Devanney and Maynard, 2008, p.10).

NUISANCE MITIGATION STRATEGIES IN NOVA SCOTIA AND KINGS COUNTY

Both the province and municipalities play a role addressing these edge area conflicts. The provincial Department of Environment regulates farm outputs into the air, soil, and water with the *Environment Act* (1994). Section 67 of the *Act* prohibits releasing any substance into the environment in amounts that may significantly adversely affect adjacent properties, but the Department rarely enforces complaints about noises or odour from farms, preferring to leave that to the Department of Agriculture (MacCulloch, 2009).

Until 2000, courts dealt with urban-rural conflicts with common-law nuisance suits. Applying nuisance tests has always been ambiguous, and perhaps not the most reliable arbiter of what constituted acceptable farming practices. In 1977, while struggling to decide whether the noises and smells emanating from a Glace Bay horse barn constituted a nuisance, a Nova Scotia judge acknowledged his ambivalence on the matter. In his decision for the farmer, he cited *Clerk and Lindsell* on tort law:

> In nuisance of the third kind, [...] there is no absolute standard to be applied. It is always a question of degree whether the interference with comfort is sufficiently serious to constitute a nuisance. The acts complained of as constituting the nuisance, such as noise, smells or vibration, will usually be lawful acts which only become wrongful from the circumstances under which they are performed, such as the time, place, extent or the manner of the performance (Brubaker, 2007, p.19).

A 1980 Nova Scotia case heard that soon after the defendant had 'top dressed' his heavily frosted lands with eighteen tons of manure, an unusually heavy rain washed some of the manure onto the plaintiff's land and contaminated his well with coli-form bacteria. The defendant argued he should be found liable only if proven negligent, and top dressing land is 'an act of normal husbandry.' The judge responded: "In considering whether a Defendant is liable to a Plaintiff for damage which the Plaintiff may have sustained, the question in general is not whether the Defendant has acted with due care and caution, but whether his acts have occasioned the damage" (Brubaker, 2007, p.20-23).

These cases illustrate how the inherent unpredictability of the common-law approach disadvantaged all landowners in edge areas. It created uncertainty for farmers who were taking every care to practice well the standards of the time and place (Brubaker, 2007, p.115n.36). This approach also disadvantaged the non-farming community. Besides reacting to instead of preventing harm, litigation only works properly when "a polluting farm can be identified, when a limited number of victims can be identified, and when the harm is substantial." When many

small polluters cause minor, cumulative damages and nuisances to many people and properties, no one has the incentive to sue, as each suit would be costly and ineffective. In the interest of predictability for all landowners, and for preventative rather than reactionary measures, land use regulations are a preferable method for dealing with these conflicts (Brubaker, 2007, p.95).

Farms types and intensities are changing in Nova Scotia, and while most once perceived farming as a natural use of land, many now view some of the activities as unnatural and even dangerous. Non-natural uses of land burden the farmer with greater than normal legal liability; even taking every care and precaution, the farmer is responsible if the non-natural use detrimentally affects a neighbouring property or landowner (Fuller and Buckingham, 1999, p.127).

Now, the courts no longer hear nuisance complaints. In 2000, to take legal pressures off of farmers, Nova Scotia adopted Right to Farm (RTF) legislation, the *Farm Practices Act*, replacing the *Agricultural Operations Act*.

Some of the most pertinent sections include:

[Defining normal farm practices]:

s.3 (g):

[The Nova Scotia *Farm Practices Act* defines] 'normal farm practice' as "a practice that is conducted as part of an agricultural operation

(i) in accordance with an approved code of practice,

(ii) in accordance with a directive, guideline or policy statement set by the Minister with respect to an agricultural operation or normal farm practice, or

(iii) in a manner consistent with proper and accepted customs and standards as established and followed by similar agricultural operations under similar circumstances, including the use of innovative technology used with advanced management practices.

[Restricting municipal power over nuisances]:

s.12 - No municipal by-law respecting a nuisance, activity or thing that may be or may cause a nuisance including odour, noise, dust, vibration, light, smoke or other disturbance applies to restrict a normal farm practice carried on as part of an agricultural operation.

[Respecting municipal power over land uses]:

s.13 - Nothing in this Act affects the ability of a municipality to apply a municipal planning strategy or land-use by-law to farm land.

In her book Greener Pastures, Elizabeth Brubaker argues RTF legislation fosters a 'right-

to-pollute' mentality through its narrow focus on protecting farmers:

In forgoing opportunities to reduce odours, farmers are often dispensing with practices that would benefit the greater environment as well. Covering manure

would help prevent run-off from contaminating nearby waters. Composting manure would reduce the amount of methane – a potent greenhouse gas – released into the atmosphere. The right-to-pollute mentality fostered by right-to-farm legislation enforces the assumption that such measures are unnecessary (Brubaker, 2007, p.93).

She further argues that beyond failing to protect agricultural land, RTF legislation also fails to ameliorate conflicts in rural communities. RTF legislation bars litigation and municipal authority over farm nuisances, and thus limits land use rights of rural non-farming residents. While lawsuits are rare, disputes are still commonplace. In Alberta, for instance, complaints about farming nuisances increased from 1,019 to 1,108 the year their RTF legislation took effect. Over two hundred of those complaints went unresolved (Brubaker, 2007, p.93).

The Nova Scotia government intended the *Act* to help establish normal farming practices and protect farmers engaged in those practices from civil action. The Farm Practices Board (the Board), a crown agency created by the *Farm Practices Act*, reviews complaints, decides whether practices are 'normal,' and recommends changing operations to mitigate nuisances. The *Act* also has the mechanism allowing the Board to develop a code of practices defining 'normal' and 'non-natural' farm practices. Thus far, the Board has developed no such code (Moerman and Crozier, 2004, p.93), and this represents a major gap in the current provincial legislation, as it removes predictability and certainty for farmers and adjacent landowners alike. The term 'non-natural' is ambiguous and problematic. With technological advances, greater scientific understanding, and increased public concern for the environment, many may dispute what constitutes 'non-natural' (Fuller and Buckingham, 1999, p.128).

Further weakening RTF legislation effectiveness, most governments rarely promote its worth to the non-farming population. A 1999 American study asserts RTF laws are successful protecting farmers from litigation, but the problem instead lies with the bad public relations, which fosters resentment and threatens RTF's long-term viability. The study suggests that legislation must be paired with education linking it to farm protection, and also intensive mitigation and mediation programs and policies in order to resolve conflicts (Adelaja and Friedman, 1999, p.577-578). Failing to link RTF ordinances with preservation policies or nuisance concerns threatens the long-term viability of the laws (Adelaja and Friedman, 1999, p.562).

A 2005 survey of Nova Scotia farmers seems to corroborate this theory, suggesting that resentment goes both ways across the urban-rural boundary. The researchers gave a questionnaire to the members of the Nova Scotia Farmers Association to gauge their responses and attitudes to environmental and regulatory issues that may have affected their farming operations.

Of the 370 respondents, 22% were from Kings County and many of them are already

involved in some sort of nuisance mitigation measures. 14% of respondents employ noise reduction measures and 21% employ odour reduction measures out of consideration for their neighbours. 18% reported increasing setbacks associated with adjacent land uses, and 60% restrict manure and spray applications. One operator each reported voluntarily planting vegetative buffers or grass buffered headlands.

The largest share of farmers, 46%, indicated the higher operations costs of new practice regulations, and 73% of these reported not being able to recover these costs through their products' market prices. 23 farmers reported increased costs associated with manure storage and handling, and 11 reported decreased acreage available for planting due to loss in riparian areas and buffer zones. 79% of farmers reported residential neighbours as the main beneficiaries of the heightened regulations, while only 62% reported farmers as beneficiaries. At least 23 farmers identified urban sprawl and residential development encroaching into rural land as the major impetus for changing regulations. The farmers especially note residents' proximity to and ignorance of farming practices as a problem. The majority of respondents voted locating residential land next to agricultural land as a bad idea (Roberts et. al, 2005, p.7-29), but this is the reality in Kings County, and is unlikely to change soon. It appears that, even with RTF legislation meant to protect farmers, farmers often bear the cost of regulations meant to protect residents, and this fosters resentment.

RTF transfers nuisance complaints from civil court to the Farm Practices Board, but Lorne Crozier, the administer of the Board, notes that many complaints never make it to the higher levels of arbitration. Most complaints concern normal farming practices, and the Department of Agriculture either dismisses these or makes attempts to mediate the conflicts by recommending farmers change their practices. Sometimes, complaints fall outside of their jurisdiction. The Board forwards complaints about animal cruelty to the Society for the Prevention of Cruelty to Animals, and complaints about chemical or manure run-offs into the waterways to the Department of Environment (Crozier, 2009).

The majority of complaints filed with the Department of Agriculture concern odour and noise, followed by smoke, dust, and vibration. The Department of Agriculture's Agriculture Resource Coordinators (ARC) address these complaints before they ever go to the Board. Neither the Board nor the Department of Agriculture keep consolidated official statistics on all of the filed complaints. To retrieve these, I would have had to file a request under the Freedom of Information Act, and compile statistics from reading each individual file (Crozier, 2009).

Crozier recalls the Board reviewing eleven complaints and dismissing eight for pertaining to normal farming practices or falling outside of the Department of Agriculture's jurisdiction. Only three complaints reached the hearing stage since the Board was created in 2001. The Board decided one for the farmer determining his manure spreading was within normal farm practices. The Board decided two cases for the complainants, and proceeded to recommend changes to the range of normal farm practices. In one case the Department of Agriculture created new standards barring fertilizing with biosolids, or sewage. In the other case, the Department shut down a mink farm and forced it to relocate when it refused to change its manure spreading habits (Crozier, 2009).

Brian MacCulloch, an ARC with the Department of Agriculture addresses nuisance complaints before they ever reach the Farm Practices Board. He estimates between 25 and 30 legitimate nuisance complaints concerning normal farming practices falling outside the Board's purview. He estimates between 25 and 30 complaints a year filed in the Valley-South Shore (Kings County) area (MacCulloch, 2009).

Farms are changing, and require new practice standards all the time. Hog farms in Kings County used to be dispersed, but now they are centralizing and consolidating. The fruit and wine industries' growth has lead to new complaints about their noisy bird-scaring tactics of gun blasts. After someone files a complaint, MacCulloch searches for different solutions used in other jurisdictions, and in the mean time works with farm operators to mitigate the offending practices (MacCulloch, 2009).

There is little legislation support for the Department's work in this area. Municipalities cannot legislate odours or noises on farms, the Department of Environment rarely enforces emission guidelines, and 'normal farming practices' definitions are notoriously ambiguous. The lack of a formal framework can complicate MacCulloch's work. He argues that with more than six hundred farms in Kings County, and over sixty thousand residents, 25 to 30 complaints every year do not necessitate more farm practices regulations (MacCulloch, 2009). However, if farms continue intensifying and growing operations, this situation may change in the future.

According to Scott Lynch, a policy analyst with the Department of Agriculture, there is no policy prescription for any potential conflicts between farm and residential land and there is no movement to change the current system. Outside of a formal approval process, the Departments of Environment and Agriculture have a memorandum of understanding to work closely with the municipalities reviewing their agricultural bylaws. The Departments of Environment and Agriculture and the Board deal with nuisances on a case-by-case basis (Lynch, 2009).

The province also advances their agricultural goals with Statements of Provincial Interest (SPI). Adopted in 1999, one of these five statements relates to protecting agricultural land and developing a 'viable and sustainable' food industry. The statements are meant to guide municipalities crafting planning strategies and bylaws. The provincial government can review any plan affecting lands with agricultural potential to ensure it is reasonably consistent with the SPI. This SPI sets out admirable **goals** for land preservation and conflict mitigation, but lacks hard

requirements (Beazley and Beesley, 1995, p.19).

The provincial *Municipal Government Act* (MGA) outlines what falls under municipal jurisdiction, including land use and nuisance levels on the urban side of the edge, and land use on the rural side of the edge (1998, s.172-1). The *Farm Practices Act*, however, bars municipalities from regulating nuisances from the farm side of the edge (2000, s.12-13). Kings County controls all of the land use bylaws in the county save for the land within three independently administered towns within their boundaries: Berwick, Kentville, and Wolfville.

MacCulloch believes that splitting the responsibility, with municipalities crafting bylaws and the provincial bodies mediating disputes, works well. The parties have an agreeable working relationship (MacCulloch, 2009).

While RTF legislation hinders municipal control over nuisances from agricultural land, and the SPI holds the municipality to pro-agriculture standards, the MGA grants the municipality authority over land uses and practices in land adjacent to agricultural land. A municipality may have the most leeway here to advance a progressive edge agenda.

Kings County Policy

Kings County's Municipal Planning Strategy (MPS) outlines two goals for the rural and agricultural areas of Kings County.

- 1.3.1 The General Goals are:
 - 1.3.1.1: To facilitate a broad economic base by:
 - supporting the continued growth of the agricultural industry
 - 1.3.3.2: To minimize and reduce conflicts between the agricultural industry and non–agricultural development by:
 - Protecting the prime agricultural areas from the intrusion of uses which are incompatible with or adverse to the future growth of the agricultural sector.
 - Establishing standards for rural uses including separation distance requirements between certain agricultural uses and incompatible uses and ensuring proper waste disposal practices.
 - Discouraging rural residential subdivision development where services would be expensive and where such development will be detrimental to the future use of the land for agricultural development.
 - Controlling the physical development of communities within or adjacent to the Agricultural District to minimize the impact of urban expansion on te agricultural industry (MPS, 1994).

In 1995, Council restored development rights to owners of all lots in agricultural zones created between March 1979 and August 1994, but denied development rights to lots created after 1 August, 1994. As requests to build in high capacity agricultural land increased, pressures

to ban development in these areas have also intensified. In 2002, in response to development pressures, Council gave post-1994 lot owners the option of seeking an agrologist's report on their land (Agricultural Working Group, 2007, p.5-10). If the landowners could demonstrate their lands consist of no more than 40% of class 2,3, or active class 4 soil, the Council would grant permission for non-farm development (Kings County LUB, 1992, s.11.1.8.1).

These guidelines may inadvertently cause new problems. The agricultural soil quality report for the area dates back to the 1960s (Cann, et. Al., 1965), and is inaccurate in some areas, so landowners have a great opportunity to challenge the existing data to make a case to build on their land (Kelsey, 2009). The pockets of lower quality soil in the midst of prime agricultural land still permitting development leads to continued land-use conflicts and potential nuisance complaints, despite the best efforts of separating the two uses. Part of the current permit process requires residential neighbours to acknowledge they are developing in an agricultural zone, but they do not waive their rights to make complaints in the future (Kelsey, 2009). In order to protect neighbouring farmers from potential future nuisance claims, and allow them use of all of their farmland, it may be wise to require a proactive mitigation technique in the development process.

The Land Use Bylaw (LUB) includes different bylaws created to achieve farm and residential property separation. Kings County's farm side setbacks are as follows:

Agricultural Zone:

3.2.5.2.1. It shall be the policy of Council to permit commercial livestock uses in the Agricultural Zone (A1) provided that livestock barns, feedlots, and manure storage and treatment facilities are more than:

a. 1000 feet [304.8 m] from a Residential or Institutional Zone within a Hamlet or a Growth Centre, with the exception of the Grand Pre Hamlet.

b. 300 feet [91.44] from a watercourse, well, or a dwelling on an adjacent property;

Minimum setbacks of non-farm developments from livestock recently operations increased from 90 m (300 ft) to 180 m (600 ft). Developers must submit a site plan for approval before the municipality will grant a permit. They must also incorporate rudimentary vegetative buffers or screens beside active, not potential, farmland (Agricultural Working Group, 2007, p.5). Buffer requirements are:

s.11.1.8.3 Any non-farm dwellings [...] shall be permitted by site plan approval in accordance with the following criteria:

c. Any required vegetative buffer should include deciduous or coniferous trees that are a minimum of 4 feet tall at the time of planting and shall be no more than 30 feet apart. Existing vegetation may be deemed sufficient to meet the buffering criteria if it is clearly demonstrated that the existing vegetation provides an adequate visual, sound and spray buffer (Kings County LUB, 1992).

Ideally, however, the plan redirects all non-farm development into eleven urban growth centres (shown in the map below). The MPS explains the rationale behind the choice of growth centres in that Kentville has become the governing and financial centre of Kings County, and New Minas has become a commercial centre. The Coldbrook – Wolfville urban corridor contains over 40% of the County's total population. The area acts as an attractively affordable commuter area for metro Halifax. The centres are already popular options for development, and so they make sense as the new focal points for non-farm development (Kings County MPS, s.1.1).





Fig 5: Kings County LUB map – Growth centres highlighted



Fig 6: Nova Scotia soil quality map – Growth corridor highlighted

Comparing the locations of the urban growth centres with the soil quality map of the same area reveals growth centres are located in the midst of prime agricultural land (in salmon), and that soil qualities deteriorates farther away from the growth centres. The agriculture zone bylaws restrict livestock operations to a minimum of 304.8 m (1000 ft) from residential zones in these growth centres. The residential zones in growth centres require no vegetative buffers, even ones as rudimentary as those required in agriculturally-zoned residential properties (Kings County LUB, 1992, s.14.1). Satisfying the farmland preservation goals of the SPI and the MPS may prove more difficult relying only on land use separation. Any measure allowing farm activity closer to developed areas would mean maximizing the productivity of the higher class soil.

A planner with Kings County explains the Council and the planning office have little enthusiasm for further regulating these edge areas. Under RTF legislation, the Department of Agriculture deals with current nuisance complaints. This process is not without its problems, the planner concedes, but the planning department has chosen to focus on the future potential problems, instead of attending to the issues arising from current land use conflicts.

The guiding perspective in the planning department is that non-farm developers are informed of the building context before building and are well aware of potential land use conflicts. Therefore, the County cannot concern itself with potential future nuisances on those properties (Fuller, 2009). While separating uses is an important part in the edge planning strategy, many loopholes allow development in the heart of agricultural areas. Since the definitions of 'normal' farming practices are nebulous, and the Department of Agriculture has to respond to complaints, and possibly require farmers to change or curtail practices, this could well create conflicts in the future (Fuller, 2009).

The literature suggests preventative measures to mitigate possible future conflicts, save the province future hassles, protect farmers from nuisance complaints, preserve farmland, and create a more definitive barrier between urban and rural uses.

STRATEGIES PROPOSED IN EDGE AREA LITERATURE

As planners look to the future, they must consider more sustainable approaches for areas where urban sprawl and non-farm development threatens the agricultural landscape. The Eastern Canada Soil and Water Conservation Centre argues that while Nova Scotia's regulatory frameworks effectively protect farmers from expensive legal processes, and can control point sources of contamination, it can also polarize regulators, interest groups, and resource users. The Centre rather favours design-based solutions, as regulations can often "create an environmental laissez-faire and disobedience attitude" (Eastern Canada Soil and Water Conservation Council, 1997, s.3.4). Academic researchers in the American Midwest (Sullivan et. al., 2004) and the Department of Natural Resources in Queensland, Australia, likewise favour design based mitigation techniques to address edge conflicts (Queensland Department of Natural Resources, 1997, s.227). To adhere to Kings County's MPS, any design based mitigation strategy must address potential land use conflicts while protecting farmers and conserving farmland.

Designs that protect water quality, maintain open space, and create true edges between the rural and developed environments could also minimize the negative impact of urban sprawl. Many studies (Department of Natural Resources, Queensland, 1997; Sullivan et. al., 2004; Tyndall, 2008; Tyndall and Colletti, 2000) suggest vegetative buffers can significantly reduce farming's negative impacts on non-farming neighbours. The findings from Sullivan et. al.'s study in the American Midwest (2004, p. 311) suggest that a variety of stakeholders at the rural-urban fringe would approve of the aesthetics of vegetative buffers.



Fig 7: Example of edge area vegetative buffers

How do vegetative buffers work?

Vegetative buffers can ameliorate odours in four primary ways:

- Diluting gas and spray concentrations
- Encouraging dust and other aerosol dispersion by reducing wind speeds
- Physically intercepting dust and other aerosols
- Acting as a sink for the chemical constituents of odour (Tyndall
- and Colletti, 2000, p.50).

"Trees and other woody vegetation are among the most efficient natural filtering structures in a landscape in part due to the very large total surface area of leafy plants, often exceeding the surface area of the soil containing those plants upwards of several hundred-fold" (Tyndall and Colletti, 2007). Bentrup further details ideal design standards. While standards may vary from property to property, general guidelines include:

- Using vegetation with fine or needle-like leaves. Broadleaf plants capture less drift but are good for reducing wind

- Providing a permeable barrier (40 to 50 % density) to allow air passage. several rows of vegetation are better than one dense row
- Planting trees or shrubs at least two times taller than the adjacent crop
- Using a mixture of plant forms to ensure no gaps
- Planting close to the nuisance source while providing an appropriate setback for equipments and drifting snow
- Including Evergreen species to offer year-round noise control
- Considering topography and existing landforms (Bentrup, 2008, s.6.4).

Effectiveness

Quantifying how effectively vegetative buffers mitigate nuisances is a difficult process. Researchers approach the problem with field trials, wind tunnel examinations and computer simulations. Some studies have reported encouraging results. A farm in Delaware recorded a 49% reduction in particulates in the airstream and a 46% reduction in downwind ammonia concentration using a vegetative buffer. A Canadian field test showed odour concentration reduced by a factor of three in a series of studies examining buffer effectiveness (Tyndall, 2008).

Buffers can reduce noise from roads and other sources to levels allowing normal outdoor activities. A 100 ft (30.5 m) wide planted buffer can reduce noise by 5 to 8 decibels (dBA) (Bentrup, 2008, p.95).



Sound Level Decrease with Distance Due to Tree/Shrub Buffer

Fig 8: Noise level mitigation with and without vegetative buffers

Applicability

Vegetative buffers have advantages over many other mitigation techniques in application. They are adaptable to almost all different types of landscapes, farm types, and farm sizes. They have aesthetic and cultural benefits (delineating the urban – rural edge; providing an attractive rural landscape) other mitigation techniques lack. Unlike mechanical mitigation technologies which depreciate over time and carry with them increasing maintenance costs and labour, vegetative buffers' effectiveness theoretically increases over time. Trees grow larger and more complex and can better mitigate nuisances through particulate filtration and increased landscape turbulence. The assumed improvement over time is contingent upon the long term health and management of the vegetative buffers (Tyndall, 2008). This future benefit is useful for planner trying to reduce potential future land use conflicts. Tyndall (2008) found appropriate site preparation essential to the long-term viability and success of vegetative buffers; it contributes to lower tree mortality, faster tree growth, and lower maintenance costs and labour inputs over time. This again highlights how important site or region specific requirements can be when establishing development permits and standards in the planning context.

Limitations

Nuisance mitigation effectiveness varies site by site, and is ultimately a function of a myriad of factors: design, ambient weather conditions, landscape topography, direction and distance of competing land uses, scale of emissions, farms' manure management protocols and use of other mitigation methods. There is also a distinct difference between a production site with a strategically designed vegetative buffer and a site with trees on it. Furthermore, vegetative buffers do not completely eliminate nuisances. The benefits are found in variously reducing the combined effects of the emissions' frequency, intensity, duration, and offensiveness. Vegetative buffers are not a substitute for comprehensive nuisance management strategies. Rather, they should be a complimentary technology used within a suite of other nuisance management strategies (Tyndall and Colletti, 2000).

Implementation

Tyndall and Colletti concede difficulties in implementing vegetative buffers:

"Barriers to adoption of vegetative buffers:

- Lack of technical information regarding species composition, site preparation, planting techniques, maintenance needs, and effective planting designs
- Lack of benefit cost analysis at farm and community level
- Lack of acceptance and promotion as a nuisance control technology (Tyndall and Colletti, 2000, page 48).

Benefits

Many researchers (Ronneberg, 1992; Lorimor, 1998; Melvin, 1996) note improved landscape aesthetics as a major benefit of vegetative buffers, since the public is more likely to accept a hidden or visually pleasing livestock operation than an entirely visible one. Sullivan et. al. examined factors related to rural stakeholders approving buffers. They asked three groups (farmers, non-farming rural residents, and academics) how they felt about no buffers, basic buffers, and extensive buffers on farmland adjacent to residential land.

All three groups indicated a strong preference (over three times as many) for basic buffers over no buffers, and residents and academics rated extensive buffers even higher still. All three groups rated buffers with trees much higher than buffers with no trees, though researchers were unsure if this was due to a perception of the treed buffers' function or form.

The researchers' findings suggest buffers may be a workable solution to the parties on both sides of the edge conflicts. Buffers can reduce pesticide movement, noise pollution, and livestock odours at the same time as they improve the visual landscape without reducing the rural character of the area. The study also highlights the possibility of incorporating buffers only on the urban side of the edge. Instead of relying on farmers to dedicate valuable resource land to buffers, a portion of land in newly developed residential areas abutting farmland could be allotted to buffers (Sullivan et. al, p.299-313). Queensland, Australia's Department of Natural Resources also makes this recommendation (1997, p.20). This would most likely shift approval of extensive buffers from residents to farmers, based on who would be responsible for the buffer maintenance, but it would satisfy the requirements of protecting farmers (Tyndall and Colletti, 2000, p.24-31).

Any government wanting to incorporate vegetative buffers into their edge planning strategy must have a legislative framework to support implementing technical requirements, and clear expectations for responsibility.



Fig 9: Reduced setback distances with vegetative buffers

Vegetative buffers in planning

Ultimately, land ownership and land-use issues need a new solution based on environmental stewardship and fairness. Or, as researchers from the Nova Scotia Agricultural College put it:

The future of farmland preservation in Canada depends on the coordinated efforts of all levels of government and the integration of economic, social and environmental issues into a comprehensive land use program designed to preserve farmland and the agricultural industry (Beasley and Beezley, 1995, p.74).

Many studies (Tyndall and Colletti, 2000; Bentrup, 2008) discuss the planning context necessary to use vegetative buffers. Queensland, Australia's Department of Natural Resources (1997) succinctly details the roles and responsibilities of each governmental department or agency associated with edge land use planning:

The Local Government must:

- Prepare strategic plans to identify and evaluate prime agricultural land and its interface with competing land uses
- Modify zoning regulations and permit application processes to reflect new space and design requirements
- Educate landowners and developers of their responsibilities and obligations
- Assess development applications on a case-by-case
- Supply site analyses to the relevant provincial departments

The Department of Natural Resources must:

- Assess quality of agriculture land within planning area
- Assist local governments interpreting site analyses for development permits

The Department of the Environment must:

- Set standards on noise and air quality
- Assist local governments assessing vegetative buffer performance standards

The Department of Primary Industries (NS equivalent: Department of Agriculture) must:

- Set standards for farm practices in concert with odour and noise emission standards
- Advise local governments on suitable agricultural land use

The Department of Local Government and Planning (NS equivalent: Service Nova Scotia and Municipal Relations) must:

- Review planning schemes and amendments submitted by local governments
- Provide policy guidance to local governments (Queensland, 1997, p.24).

While Queensland has published a very detailed guide, its planning framework is

sufficiently different from Kings County to diminish the power of comparison. The guide and its technical specifications are still useful as a reference for the many different possible facets of policy implementation, and will be referred to as the report progresses.

British Columbia's edge planning guides (2003; 2006; 2009) are leading examples of Canadian vegetative buffer implementation strategies. Both supply numerous reports detailing design criteria and specifications matching the standards in the literature and recommendations for the planning context surrounding edge planning.

If Kings County adopted the planning strategies and technical guidelines recommended by BC policy makers, it would mean great changes to the planning framework and the design standards on the urban-rural fringe, with mixed benefits.

BRITISH COLUMBIA'S EDGE PLANNING STRATEGY

The following precepts guide BC's edge planning strategy:

- Zoning bylaws restricting the types of agriculture next to urban edges (such as requiring large set backs from property lines for agricultural buildings, minimum lot size requirements, animal density control, or completely prohibiting certain types of agricultural commodities within specific areas) unnecessarily restrict agricultural development opportunities (BC Department of Agriculture and Lands, 2009, p.3).

- Edge planning relies on shared responsibility. Along with improving education and cross-boundary relations, this means recognizing "that it is reasonable for landowners along both sides of the urban/ALR boundary to share the benefits and impacts from edge planning implementation." Ideally, this means establishing similarly sized edge planning areas on each side of the boundary, and amending and adopting laws encouraging more intensive land use and stronger management practices along the edge (BC Department of Agriculture and Lands, 2009, p.4).

British Columbia addresses land use issues primarily with their *Agricultural Land Commission* (ALC) *Act* and RTF provisions in the *Local Government Act*. Their RTF legislation is very similar to Nova Scotia's, barring nuisance suits against farmers practicing normal farming techniques. The ALC created a provincially controlled Agricultural Land Reserve meant to preserve large swaths of prime agricultural land. This split land use control between municipalities on the urban edge and the province on the agricultural edge.

Bert van Dalfsen, with the Management Branch of BC's Ministry of Agriculture, explains

the policy structure affecting the urban-rural interface in British Columbia. The Agricultural Land Reserve provides "a stable urban-rural interface to plan around." Normally, the ALC and the Minister of the Department of Agriculture and Lands have the power to regulate farm practices and land use in the ALR. Only four local governments, including the Township of Langley, are regulated under s.918 the LGA, allowing them use of ALC approved farm-side by-laws. Any local government can use the urban-side tools, and some have taken a farm-friendly approach to development on the urban side of the boundary (van Dalfsen, 2009).

The Township of Langley was the pilot project for this integrated planning approach. Their council has not yet adopted the full set of recommended provisions, so the ALC still has control over agricultural land use in Langley's ALR zone. The Department of Agriculture and Lands will be starting work in the other communities in the next year or two to implement the edge planning initiative in those communities (van Dalfsen, 2009).

Role of zoning and farm bylaws:

Edge planning requires a combination of zoning bylaw and farm bylaw. As a zoning bylaw cannot regulate activity, a farm bylaw designed specifically to address farming activity is necessary. British Columbia's LGA (s.917) and Nova Scotia's MGA (s.12) both allow local governments to address things like farm building placement, types of buildings, machinery and equipment, and siting stored materials, waste facilities, and stationary equipment. In BC, before a local government can adopt a farm bylaw, the Minister of Agriculture and Lands must approve it (BC Department of Agriculture and Lands, 2009, p. 29). In Nova Scotia, municipalities must draft bylaws within the spirit of the SPI. The Kings County planning department works closely with both the Departments of Agriculture and Environment when they draft municipal by-laws, but under a memorandum of understanding, rather than in an official capacity (MacCulloch, 2009).

The BC Department of Agriculture and Lands notes the size of the edge planning area should vary not just in length but also in width. Ideally, the area should cover a minimum of 600 metres, spanning both sides of the urban-rural edge. The minimum area on each side of the interface is 300 metres (2009, p.8). The Department provides a guide to planning on both sides of the boundary.

They recommend five different elements in urban-side edge management:

- Farm friendly subdivision, road and building design
- Rainwater control
- Disclosure statements
- Edge signage and information packages to promote understanding of farm practices
- Buffers (2009, p.13).

	Setback Distance and Buffer Size	Buffer Height	Buffer Design Features			
Urban-side Residential Setback & Buffer*	Setback 30 m from ALR boundary Buffer Width 15 m – buffer is located within the 30 m setback	6 m (finished height) If spray drift is a concern, tree height should be 1.5 times the spray release height or target height, whichever is higher.	Mixed planting of fast growing tree and shrub species with foliage from base to crown – long thin foliage desirable. Include at least 60% evergreen conifers to collect dust & spray drift. No gaps in buffer and no tightly packed hedges; crown density of 50-75%. Design as wedge shaped if odour dilution desired. Design specifications and layout will be as per urban- side Buffer A or B Leave 2 m of low growing or no vegetation from ALR boundary.			

Site standards for buffers are detailed below. Technical design standards are represented after the tables.

The Department recommends incorporating the following steps on the farm side of the boundary:

- Manure handling practices
- On-farm composting
- Noise, odour and dust management
- Light management
- Safety measures

Setback distances determined by animal limits Buffers (2009, p.29).

Farm-Side Setback and Buffer Design Criteria

	Setback Distance and Buffer Size	Buffer Height	Buffer Design Features
Farm-side Setback and Buffer	Setback 60 m from the ALR/Urban boundary (except horse paddocks = 7 m) Buffer Width 6 m - buffer is located within the 60 m setback Exception for Greenhouses: Buffer applies to greenhouses located 15-100 m from the ALR/Urban boundary	6 m (finished height)	The length of the vegetative buffer should be established within 15 m of the farm building or structure and extend a minimum of 5 m beyond the length of the wall facing the ALR/Urban boundary. Plant either a double row of evergreen conifers or mixed planting of deciduous/ coniferous tree and hedging/screening shrub species with foliage from base to crown – minimum of 60% evergreen conifers. Crown density of approximately 50-75%. Design specifications and layout will be as per Farm- side Buffer A or B.



Fig 10: Odours and visual buffer design guidelines



Fig 11: Noise, odours, and visual buffer design guidelines

If edge properties meet these buffer requirements and other edge planning standards, planning guidelines can relax setback distances for both residential and farming building placement.

BC includes two sets of reduced setback standards, depending on the number of animals in each farm operation. Farmers must locate buildings containing between: 45 and 82 cows; 6 (sows) and 55 (growers) hogs; or 15, 000 (layers) and 30,000 (broilers) birds, **between 60 and 99 metres from the urban boundary** (B.C. Department of Agriculture and Lands, 2009, p.34).

Farmers must locate buildings containing between: 120 and 160 cows; 90 (sows) and 220 (growers) hogs; or 30,000 (Layer breeders) and 225,000 (broiler meat) birds, **between 100** and 300 metres from the urban boundary (B.C. Department of Agriculture and Lands, 2009, p. 35).

While Kings County does not offer specific livestock numbers for every farm, StatsCan provides countywide data. In 2006, 43 farms reported a total of 56,599 hogs, or an average of 142 sows and 1,669 growers per farm (StatsCan, 2006, i). The county also has 113 cattle ranching and farming operations, 71 poultry and egg operations, 56 greenhouse operations, and 71 crop and grain operations (StatsCan, 2006, f). While this may not place Kings County farms in the upper ranges of farm sizes, it is reasonable to expect that some, if not most, of these farms fall within BC's two setback limit guidelines.

Queensland offers more generalized minimum setback distance requirements based on open land setbacks or buffered setback.



Fig 12: Reduced separation distances with vegetative buffer

Their guidelines are a minimum standard based on landscape features found in Australia. Kings County's planning department would have to evaluate local sites and farm practices before making a final recommendation on minimum setback distances. These are simply examples illustrating the potential reclamation of productive farmland if the planning office used vegetative buffers instead of relying solely on setbacks for nuisance mitigation.

Revisiting Kings County's current set back requirements highlights the farmland preservation potential of vegetative buffers. All new non-farm dwellings in Agricultural Zones must be situated a minimum of:

600 ft [182.88 m] from any Intensive Livestock operations, and within 100 ft [30.48 m] of the lot's front line (Kings County LUB, 1992, s.11.1.8.3).

New livestock buildings in the Agricultural Zone must be located a minimum of

1000 ft [304.8 m] from any residential zones in urban growth centres, or

300 ft [91.44 m] from any well or dwelling on an adjacent property (Kings County LUB, 1992, 11.1.9)

Kings County's setback requirements for dwellings within the agricultural zones (between 91.44 m and 182.88 m) are within the limits suggested by the BC documents, so long as the property owners incorporate buffers into their site plans. The Kings County LUB only requires these residential property owners plant a single line of deciduous or coniferous trees, each no

more than 30 feet apart, and a minimum of 4 feet tall at the time of planting, beside **active** farmland (Kings County LUB, 1992, s.11.1.8.3). This is not up to the standards suggested by the BC documents, or any other guides reviewed in the literature. Moreover, the Development Officer for the county, Kim Kelsey, noted that site plans only have to incorporate the bare minimum of buffers required by the LUB, and the development office pays little attention to adequacy of spray and sound reduction (Kelsey, 2009).

Any new livestock operations in Kings County have a minimum setback of 1000 ft [304.8 m] from residential zones in any urban growth centres. BC recommends a maximum setback between 66 and 300 metres, depending on intensity of the operation, and as long as the plan incorporates landscaped buffers. With no vegetative buffers required on either side of these boundaries, these set backs may not be sufficient to protect residents from potential nuisances. With landscaped buffers, the municipality could reduce the setback requirements by 233 metres, potentially saving a significant amount of farmland from inactivity.

Like Nova Scotia, British Columbia must also deal with existing land use conflicts. Recognizing the inherent cost and difficulty of retrofitting an existing farm operation to the newer guidelines, they recommend treating those properties as non-conforming. Mediators would work with the farmers to address any nuisance complaints with improved farming practices (BC Department of Agriculture and Lands, 2009, p. 29). Agricultural Resources Coordinators in NS already serve in this capacity, dealing with farms as non-conforming and mediating conflicts in this way.

BC's recommendations in practice have mixed outcomes. The Township of Langley, population 93,726, has 1,292 farms over 32,050 acres of farmland (StatsCan, 2006, a). Cattle farms, poultry farms, hog farms, orchards, and greenhouses dominate the agricultural sector (StatsCan, 2006, b). Hog farms, one of the most contentious farm types, account for 39 of all of the farms, with 3,749 animals (StatsCan, 2006, d). While its provincial context (located near Vancouver) creates more real estate pressures there than in Kings County, its size and farm types are similar enough to provide useful illustrations of BC's policies in action.

In 1993, Langley adopted its Rural Plan, and became one of the first largely urban municipalities to intentionally focus a planning exercise on its agricultural area (Smith, 1998). Most of the agricultural land in the rural area lies within the ALR boundaries, administered by the ALC. The Township has a very long urban/rural interface, varying in land uses, lot sizes and physical characteristics (Township of Langley Rural Plan, 1993, s. 1.2.1).

Langley's goals are very similar to Kings County's, but they address these goals with edgespecific plans, instead of only rural and urban plans. Section 4.0 of the plan states:

New urban communities in the Township shall be developed based on the following principles:

The boundary between urban areas and rural areas should be carefully planned and designed to create a clear limit on urbanization, to create an attractive edge that integrates Langley's rural/agricultural character into its communities, and to minimize negative impacts on rural areas. This can be achieved by:

- creating greenbelts between urban zoned land and the ALR
- ensuring that the urban/rural boundary is "defendable"
- using parkland as a buffer between urban and agricultural uses.

[...]

Council recognizes that the Agricultural Land Commission Act takes precedence over the Langley Official Community Plan (Township of Langley, 1979, s.4.0-4.1).

Non-agricultural developments along the edge "shall provide buffers adjacent to agricultural land and the siting of buildings and access shall minimize negative impacts on agricultural uses" (Township of Langley, 1993, s.5.5.2).

Langley uses urban growth centres to achieve these goals of separation and mitigation. Some of their centres are located in the ALR, and are incompatible with ALR regulations. Centre boundary negotiations are ongoing, and growth could still be redirected (Township of Langley, 1993, s.5.4.1).

According to a planner in Langley, the border conflict issue is unresolved. On the urban side abutting agricultural areas, Langley is subject to ALC dictated requirements. These include rudimentary vegetative buffers meant to mitigate noise and odours, located only on the urban side. The buffering consists of a 10 metre stretch of vegetation on a berm. He notes this system works as a mitigation technique when located next to traditional family farms, but is entirely inadequate next to industrial farms (Geraghty, 2009) Basic buffers often work in low conflict areas, but need to be more robust to deal with industrial farms.

The Township has been pushing the province for many years to limit intensive farm uses on their side of the boundary. The province strictly interprets Right to Farm legislation and refuses to change practices. The Township advocates limiting boundary farm uses to family farms, and keeping the industrial farms near the interior of the ALR, but the ALC has not made these changes. Townships planners argue that more compatible edge uses will benefit the province, as the province is responsible for dealing with nuisance complaints and protecting farmers' rights. There are restrictive covenants on farm-adjacent residential properties now, informing residents of farm activities, but it is notification only, and nothing to stop them from complaining about nuisances. "The Farm Practices Board is supposed to resolve conflicts, but there should not be conflicts in the first place" (Geraghty, 2009)

IMPLICATIONS

Following BC's recommendations to incorporate vegetative buffers into edge conflict mitigation strategies would mean changes to both the policy framework in NS and the land use bylaws in Kings County, with mixed results.

The NS Department of Municipal Relations would need to amend the MGA to reduce municipalities' power over farm bylaws. The Department of Agriculture would need to take greater control of agricultural land, leaving municipalities with zoning and bylaw authority residential land in edge areas. Currently, the municipality is responsible for zoning bylaws covering new development on agricultural and residential land, and the province is responsible for mediating existing conflicts in edge areas. All of the NS policy officials I contacted reported satisfaction with the current division of responsibility in these areas (MacCulloch, 2009; Fuller, 2009; Lynch, 2009). Moreover, Langley's planner expressed some frustration over the municipalprovincial relations in BC (Geraghty, 2009). Nova Scotia power structures may not need to change. If, however, farms intensify and population pressures rise, so could difficulties managing land use conflicts in the edge areas. Incorporating mitigating standards into current plans may reduce future conflicts and pressure on the Department of Agriculture. The County could take a more proactive approach to nuisance mitigation with their urban side land use policies.

The Department of Natural Resources would have to update agricultural land reviews to provide data on existing conditions to aid other departments developing vegetative buffer requirements.

The Departments of Agriculture and Environment, along with the Farm Practices Board, would have to jointly create noise and odour emission standards to guide vegetative buffer design requirements, but not to use in litigation against farmers. Achieving this balance may be difficult.

To implement a edge planning strategy, Kings County must either expropriate and modify the land itself, or apply new zoning and development regulations to privately owned land on each side of an established boundary. As private individuals own the vast majority of land in Kings County, buying the land to have greater control over edge planning may be too financially daunting for the County. Incorporating new design criteria into private land means either altering zone bylaws or creating development permit areas, which means changing the regulations of, but not the nature or size of the urban growth centres. The County would also need to coordinate bylaw changes with the three independently administered towns within their boundaries (Berwick, Kentville, and Wolfville). A planner with Wolfville indicated that the Town already works closely with the County while drafting their land use bylaws, and they are very committed to ensuring any farm intensification on their perimeters is properly managed (Morrison, 2009). After provincial bodies have determined buffer requirements, Kings County can make setback distances specific to every site, or apply the maximum setback distances to every edge property, with the expectation that farms will most likely grow and consolidate. Siting each specific lot means more labour and capital outlay for development permit office and the planning department, but may minimize productive farmland loss. Generalized guidelines offer a streamlined approach, and anticipate farm growth, but may sacrifice potentially viably farmland in the process. It is also important for setback requirements to incorporate distance requirements from watertables and wells. This may mean that intensive livestock operations will still require a significant setback from residential wells, but it may still allow smaller livestock farms and grain and field based operations to reduce setbacks. Other farm side management policies will determine the eventual setbacks.

Queensland's Department of Natural Resources acknowledged how difficult establishing buffers requirements on individual odour or chemical spray compositions would be from a planning perspective. At the very least, determining the nature of sprays from each individual farm would take an enormous amount of man-hours and resources, and it is likely that farmers will change their sprays and field applications along as farming products, practices, or resources change. So, based on available research, the Queensland researchers established a minimum buffer width of 300 m on open ground conditions, and 40 m where vegetative buffers are satisfactorily planted and maintained (1997, s.3.7 - 3.9). These requirements may change in the Kings County context, but they support the option of creating standard vegetative buffer and set back requirements in Kings County.

Following BC's guidelines for municipalities, Kings County would also have to add vegetative buffer requirements to farm properties. Minimum lot sizes are large enough to accommodate them, but this would add more cost and labour burden to farmers, contradicting the protection and preservation goals outlined in the County's MPS.

MacCulloch, with the NS Department of Agriculture, notes that a vegetative screen planted between a farm and a residential area would have similar benefits whether it were planted on the residential side of the farm side, but he also receives nuisance complaints from drivers commuting past the farms (MacCulloch, 2009). For buffers to have any positive effect in these cases, they would have to be planted on agricultural land, beside the roads. However, implementing buffers on the farms beside the road may have negative economic results, as agritourism adds value to the Kings County economy (County of Kings, Nova Scotia. Agriculture Working Group. Final Report, July 2007, page 7).

If Kings County were to incorporate more extensive buffer requirements into agricultureadjacent residential lots, they would have to expand the minimum front, rear, and side yard requirements, based on farm placement and specified buffer requirements. If the minimum vegetative buffer requirement is 60 m (Queensland, 1997, p.19) or a 15 m wide vegetative buffer within a 30 m setback from the agricultural edge, as suggested by BC, the LUB must increase the current requirements for rear and flanking yards (between 6m and 14m in both Agricultural and Residential Zones) to accommodate the buffers (Kings County LUB, 1992, s.14.1.9., s. 11.1.22).

If the County wishes to use site-specific buffer requirements, it could use development permits instead of site plans on farm-adjacent residential lots. Development permits are more time, cost, and labour intensive, as they address the nuances of each property, but they have the advantage of minimizing farm land lost in the edge area, and maximizing the efficiency of planted buffers. Alternatively, site plans could still incorporate standard buffer requirements at a reduced effort and cost to the planning department, while potentially sacrificing some viable farmland.

RECOMMENDATIONS

The Province and Municipality may not be keen for further regulating the urban-rural edge (MacCulloch, 2009; Fuller, 2009), but new design guidelines could potentially reduce land use conflict and preserve farmland, serving two major goals of the Kings County Municipal Planning Strategy. The two levels of government need not change their legislative framework, but rather work proactively and in close concert with one another to implement these new measures on privately owned residential land in edge areas.

The two policy options are:

1. Standardizing vegetative buffer requirements in all residential lots bordering agricultural land, which would entail:

Provincial work

- establishing a baseline vegetative buffer requirement

<u>Municipal work</u>

- changing subdivision rules in the urban growth centres
- changing minimum lot sizes and building envelopes in non-farm developments in the Agricultural zone, and
- reducing setback requirements.
- 2. Establishing performance criteria for vegetative buffers, and applying standards to agriculture adjacent residential properties on a site-by-site basis. This would entail:

Provincial work

- establishing nuisance levels/buffer performance levels

Municipal Work

- creating development agreements zones around edge area residential lots
- incorporating the buffer designs to meet these performance standards
- reducing setback requirements.

Recognizing the potential for uneven buffer efficiency site-to-site and loss of some productive farmland, for administrative ease and lower demands on County resources, I recommend option 1. Before making these changes, the provincial and municipal governments must first jointly investigate potential costs and impacts on property ownership and development in urban growth centres, evaluate the local natural context, and implement other nuisance mitigation measures recommended in the literature.

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