Do Bylaws Matter?
Evaluating Conservation Subdivision Design

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Abstract

This research investigates what public and private purposes are being achieved in projects permitted as conservation or open space subdivisions. An expert panel evaluated nine conservation subdivision designs (CSD), and found that CSDs overall provide more ecologically functional designs than would occur under traditional subdivision layout. In particular, open space goals tend to be well-achieved, while other aspects such as creativity, housing diversity, and other public goods are less satisfactory. However, evidence suggests that underlying socioeconomic and planning board issues are more explanatory in overall quality of projects than the specific contents of individual CSD bylaws. Results of related research in other regions indicate that CSDs tend to occur in the direct path of development pressure, tend to increase rural sprawl, and occur under a wide spectrum of bylaws. The study finds that CSD outcomes could be improved through support for well-trained and empowered planning boards. Improvements in bylaws are recommended, including stronger design quality components, connection of open space to form habitat corridors, and development of clear evaluation rubric(s) that could help planning boards better negotiate for higher quality projects.

About the Author

Elisabeth Hamin is an assistant professor of regional planning at the University of Massachusetts, Amherst. She researches growth management policies, as well as the social and political dynamics that underlie community support for and opposition to land use regulation and protected landscapes.

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Introduction and Research Questions

The purpose of this study is to evaluate the implementation of a form of suburban and rural land development regulation, Conservation Subdivision Design (CSD), also called Open Space Residential Design and a variety of other similar names. In CSD, a parcel of land, usually of several to one hundred acres, is designed to place homes in one concentrated area of the parcel, typically the least environmentally sensitive, while at least 50% of the project land is preserved as open space. The public goals this is intended to serve include the private provision of protected open space, improved environmental performance of projects, diversity of housing types, and connection of the preserved open space to other protected lands to create networks of habitat and recreation lands (Arendt 2004, 1999). This style of development is increasingly recommended by professional planners and advocacy groups and adopted by municipalities,[i] and surveyed planners believe that cluster/conservation subdivision bylaws are among the most effective means of preserving rural character (Ryan 2002). Making them work well is thus an important policy goal.

Our research questions for this study are as follows:

- Is the CSD method able to achieve a broad set of public goals, or is it more limited to achieving environmental/open space goals?
- Are the apparent open space benefits of CSD largely privatized to the residents of the development, or do those benefits have significant spill-over to the broader public?
- Is there a clear connection between the contents of their relevant bylaws and the relative quality of the projects as built? What aspects of the bylaws seem to contribute most to project quality? If bylaws do not matter, are there other factors that are more explanatory?
- Overall, are CSD projects better than the alternative underlying zoning?
- What is the policy significance of the findings – what changes to CSD theory and implementation seem needed (if any) to better achieve the goals of CSD and good planning? What advice do the findings provide for municipalities planning to write CSD regulations in the future?

These questions are phrased more formally as hypotheses in the findings section of the paper.

Policy And Research Context and Literature Review

As the nation struggles to define and implement 'smart growth,' one of the key challenges is the design of new housing subdivisions. Absent clustering or environmental constraints, a typical suburban development will use the whole site for private home-lots and infrastructure such as roads. Problems noted with this style of development include, among other issues, the homogeneous design of homes, habitat

fragmentation, and lack of sensitivity to site constraints and natural functioning of the ecology of the site such that development occurs on steep slopes, near wetlands, and proximate to aesthetically important features such as beautiful views, often privatizing these (Conservation Law Foundation and Vermont Forum on Sprawl 2002; ULI--Urban Land Institute 1998). Anticipating this discussion by many years, Randall Arendt, Henry Dodson, Elizabeth Brabec and Robert Yaro developed Conservation Subdivision Design (CSD) in the 1980s as an alternative to the standard form of subdivision development and improvement over more traditional clustering (Arendt et al. 1988).[ii] The basic concept of CSD is fairly simple. Given a certain parcel planned for development under standard single-family zoning, the unit yield under existing zoning or with a modest density bonus is instead accommodated on less than 50% of the parcel, with the remaining lands placed into conservation (Arendt 1999). Resulting homes are often still single family, but are placed on smaller lots while the most environmentally sensitive lands are preserved.

The key differences between this and previous versions of clustering are that the focus of preservation is on environmentally sensitive lands, rather than just left-over parcels as too often happened in traditional clustering, and that a higher percentage of the parcel is put into conservation. The authors also recommend a specific four-step process for site design, which begins with a site analysis indicating key resource areas to be preserved, then locates house sites to best assure views of open space, aligns roads and paths to connect the house lots, and only then draws in lot lines. This was a popularization of the basic approach of landscape architecture and planning in a post-McHarg (1969) period; McHarg first popularized the maxim that one fits development to the landscape rather than the other way around, and identified the steps above as the appropriate general approach to site design. The concept of CSD can thus be understood as a refinement of preexisting cluster and site analysis methods to achieve more land preservation and a higher standard of environmental performance. Crucial to the early and continuing popularity of CSD were the excellent graphics of the 1988 book, which created a persuasive image of the benefits of this form of development in a way that was highly accessible to community members (see image right).

CSD, like all forms of development, is subject to federal, state, and particularly municipal regulation. If a town or city wishes to encourage CSD as a style of development, they will adopt ordinances or bylaws to this effect so that CSD becomes one of the standard methods for receiving a development permit. Typically, these bylaws serve as a voluntary alternative to traditional subdivision, although some communities make CSD required for larger projects or require dual-submittal. Under the voluntary submittal, Planning Boards typically must issue a special permit that includes affirmative findings on how the proposed site plan achieves the stated goals of the municipal CSD bylaw.[iii] To reward developers for this provision of public goods, cities and towns may provide density bonuses for CSD projects, whether through outright allowance of more units or implicitly

through including as 'buildable' land that would not count in a traditional subdivision, whether because of steep slopes, wet soils, or other site constraints.

The theory of CSD suggests that benefits the developer receives from CSD developments as compared to traditional subdivisions include a reduced cost of infrastructure development (Arendt et al. 1988), and increased home values by virtue of their proximity to open space (Arendt 1997; Geoghegan 2002). The achievement of these private CSD goals, particularly increased property values, has been tested and found fairly compelling (Kaplan, Austin, and Kaplan 2004; Geoghegan 2002; Arendt 1997). Developers' evaluations of cluster subdivision compared to traditional large-lot development support these findings, namely that cluster subdivisions saved money on infrastructure, improved marketability and sales, but were slightly harder to get permitted (Ryan 2002). It is not clear, however, what the role of municipal regulations is in developers' decisions to use CSD or traditional subdivision design. Ryan (2002) found that developers were motivated to protect natural and cultural features of the landscape primarily to improve the marketing of the property, but also because it "reflects my personal values," while government regulations were a less important motivation according to the survey.

Purchasers select a CSD home for the view of 'nature'; CSD communities achieved that view better than traditional subdivisions and thus were viewed as more successful from residents' perspectives (Kaplan, Austin, and Kaplan 2004). Maintaining a public view of open spaces also contributes to residents' perceptions of a development fitting into the rural character of the community (Ryan 2002).

Anticipated public benefits to this development technique center on its potential to protect interconnected networks of open space, including natural areas, greenways, trails and recreational land (Arendt 1999, 2004). In some cases, CSD land can serve as a buffer to working farmland, thus reducing conflict between farmers and suburban residents (Arendt 1994), although the effectiveness of this is disputed (Daniels 1997). Further claimed public benefits of CSD are an increased diversity of housing types, and reductions in municipal costs to provide public goods such as open space and recreation (Arendt 1999). Indeed, some exemplary projects achieve these goals; authors have identified excellent projects built under this type of bylaw (Thompson 2004).

There are in addition related but expanded goals that can be identified for good site planning, but are not typically noted for CSDs. These could include support for the broader ecosystem functions of the project's region (Perlman and Milder 2005), connectivity and pedestrian access to the surrounding area (Calthorpe and Fulton 2001), achieving higher densities where appropriate, and encouraging public access and use of the preserved lands (Hamin 2006), among others.

For this research, our goal is to both evaluate CSD per se, and also to connect the outcomes of those evaluations to the underlying regulations or other socioeconomic conditions for each project. In terms of evaluation, one of the primary challenges in planning research is that there are many confounding factors in the implementation of plans and regulations, making drawing clear connections between planning and outcomes challenging. To address these issues the research design utilized policy and planning

evaluation implementation literature (e.g., Rossi 1999; Hambleton and Thomas 1995; Madsen 1983; Shefer and Kaess 1990; Laurian et al. 2004; Baum 2001; Murtagh 1998; Alexander 1985) for key ideas regarding how to structure the evaluation. This developing specialization holds promise for planning in understanding the challenges that lie between conceptualization of good planning and its implementation in the community. Because of this complexity and a sense that one important contribution of this research is in the method utilized, we spend a fair amount of words here describing the research method; those who wish to get right to the findings can skip to page 14.

The evaluation literature illuminates several layers of complexity that must be addressed. The first is the level of evaluation. There are three levels available:

1. The theory of CSD including recommended process, bylaw content, and design prescriptions,
2. The bylaws and ordinances as legislated by communities, or
3. Specific projects undertaken under those bylaws.

The evaluation for this research project occurs at the third level, that of the projects themselves; descriptive statistics were gathered and analyzed for the second, bylaw level. The results of the evaluations for each project were compared to their relevant bylaws and other background information. It is thus an evaluation of policy implementation.

A second level of complexity resides in the question of what criteria to base the evaluation upon:

1. Internal to the goals laid out by Arendt, the primary continuing proponent of CSD,
2. Internal to the goals indicated in relevant municipal ordinances, or
3. External to broader criteria derived from accepted definitions of good planning.

To maximize the validity of the research, we developed the evaluation criteria based on analysis of a random sample of bylaws within the study universe, including all the cities from which the sample is drawn (n=9) plus 21 other cities, randomly selected. The study thus is internal evaluation to a representative set of typical public goals for municipal CSD ordinances.

A final issue is the question of an incremental improvement over traditional development versus the optimum imaginable site design. To address this question, on the evaluation instrument we included summative questions asking about the quality of the plan in relation to traditional subdivisions, and to some imagined ideal designs. Thus the first part of the evaluation is to the site plan itself based on the set of typical municipal goals, while the second part is a more general evaluation of the quality of the plans.

To clarify the connections between the bylaws, projects, and project outcomes we identified several research hypotheses to test. These are presented below, and are used to organize the findings. The evaluation instrument is included in the appendix.

Research Method

The research design uses Massachusetts as an in-depth case study; using just one state reduces some of the intervening complexity from differing state regulations that would enter an analysis including multiple states. The investigation included descriptive statistics on state-wide cluster regulations in municipalities across the state, and an expert panel evaluation of nine specific projects built under a CSD mantle. To make the analysis more broadly applicable, other authors investigated CSD in other states, as described below.

Phase 1: Bylaw Collection

The first phase of the project determined the extent of CSD ordinances within the Commonwealth of Massachusetts municipalities. The census of all community ordinances was developed by reviewing the online bylaw database *Ordinance.com,* systematically querying the universe of Massachusetts municipal bylaws and ordinances[iv] for examples of cluster development regulations.[v] Bylaws from 234 of Massachusetts's 351 municipalities met the criteria, and were downloaded. Some municipalities have multiple bylaws that meet the definition of cluster development described above, so the actual number of cluster bylaw examples is 264. We have thus determined that there is a sufficient universe of bylaws to make for a meaningful analysis.

Phase 2: Bylaw Analysis and Categorization

The selected bylaws were then systematically sorted to eliminate those that are not fitted to the goals of the project such as those for age-restricted housing or other very specific uses, and a final categorization of the remaining universe was developed. The bylaws were categorized into four groups, based on three criteria. The non-environmental cluster bylaws (category D) vaguely state that some percentage of land should be preserved as open space, while the environmental cluster bylaws (category C) state *what* should be preserved. Those termed proper CSD bylaws specify *how* the preserved open space should be determined or designed. Within the CSD bylaws, there are two categories: those that require a four-step process which may also have design guidelines (category A), and CSD without four-step process (category B) but with design guidelines. In general, category A is considered to have the strictest regulation and category C the least, but there remains some variation among bylaws in each category. Our review of bylaws indicates that the distribution of the bylaws across the categories is as follows:

[See Table 1: Bylaw Analysis Page 20]

Category D, the non-environmental cluster, were primarily much older traditional cluster bylaws, and were eliminated from further research.

Phase 3: Survey of Sample Communities

Once the bylaws were analyzed and categorized, we surveyed by email with telephone follow-up those communities with professional planning staff who had bylaws in the A,

B, and C categories.[vi] The survey instrument's primary purpose was to ascertain how many developments had been permitted under the town's/city's cluster or CSD bylaw/ordinance(s) since 1997. This eight-year window was chosen to reflect the start of the widespread dispersion of Arendt's theory. Respondents were asked to include an identifier for each development, such as permit year/number, subdivision name, or address. The identifier enables the compilation of a master list of all cluster developments permitted in the survey communities since 1997. The map below illustrates the geographic dispersion of survey respondents.

[See or insert Map]

Results were as follows:

[See Table 2 Page 20: Permitting outcomes in CSD municipalities]

As this table suggests, our response rate was good across the categories. There was not a huge difference in whether projects had been permitted under the CSD bylaws between those that had fairly weak bylaws (category C) and those with the apparently strongest (category A), although the category C communities had fewer developments per community. From these results, it does not appear that the content of bylaws specifically drives whether communities have their bylaws utilized or not.

Phase 4: Selection and Collection of Sample Development Plans

We then assigned each project a number, and coded them for their bylaw category. To select our random sample sites, we excluded projects that were far from the I-495 ring outside of the Boston metropolitan area, to increase the consistency of conditions within communities; this kept the preponderance of communities in the sample universe, since most responding communities were located generally in the I-495 ring (see map). We then used a random number generator to select three projects per category, providing a total of 12 primary projects as part of our initial review group. We were able to get responses in nine of the selected towns, providing three good sites within each category. A research assistant visited each of the nine towns/cities to meet with planning staff, get copies of plans, hear the story of each development, and then visit the site to take digital pictures of the project area and surrounding neighborhood and environmental context. Each project was then written up in a summary form.

Phase 5: Expert Panel Review of Sample Development Plans

Once the stratified random sample of sites has been visited, photographed, and plans collected, a panel of experts was organized to evaluate the site plans. The panel included six persons, with three Landscape Architecture faculty from the department here at UMass with differing areas of specialty, one faculty member from a different Landscape Architecture program, one practicing planner, and one practicing landscape architect. The workshop lasted six hours. I moderated the panel, while the research assistant presented the projects themselves. Careful notes were taken of the discussion.

For each site, one week in advance of the panel we gave each expert a file on each project including a summary sheet with basic information (number of units, size of site, underlying zoning yield, context analysis, etc.), orthographic photos of the site before and after the construction, the set of plans that were filed with the approved permit, photographs of the site, the CSD bylaw, and an evaluation form. During the panel, we first discussed the criteria, getting general consensus on the meaning of the words; this discussion proved quite complex, and took about one hour. The research assistant then presented each project and the initial rankings from the evaluation form participants came to the meeting with. Project by project, the group asked questions and discussed their preliminary evaluations, and participants then changed any rankings they chose.

Phase 6: Conference Panel for National Findings

To broaden the findings, Bruce Dotson, Anna Haines, and Chris Ellis were recruited in 2005 to consider the research/practice issues associated with CSDs in their region. We organized a roundtable at the 2006 Associated Collegiate Schools of Planning Meeting; the Dotson and Haines ACSP papers are attached to this report. As a group we view this stage of research as exploratory, as we are still determining the best evaluation methods. With this in mind, each researcher was asked to look at CSDs in their home state, but to undertake evaluation in a way that made sense to them; this allowed us to compare both evaluation outcomes and methods.

Reflections on the Method

Overall we found the method utilized in Massachusetts to be effective, but time and resource consuming. Preparing the bylaw universe, categorizing, undertaking site visits, and preparing files for the experts took steady 10-hours per week work by the research assistant over seven months, plus supervision time. We were fortunate to not have difficulty attracting participants for the panel, but the method does require a significant time investment from the experts. It thus would be difficult to use this method for more than the number of sites we analyzed. Because analysis is limited to a fairly small set of projects, the ability to reliably generalize the findings is not all one would wish, and as always, the analysis would benefit from a wider sample.

A key concern among the panel members was that the language used in the evaluation instrument was open to individual interpretation; an improvement to the method would be to include a glossary that set our shared meanings for such terms as open space and the variety of functions open space could validly serve, whether housing diversity related to the overall community or just the site, and similar issues for almost every question on the evaluation form. The panel thus spent about one hour at its start discussing terms to come to some consensus on meanings for use as they revised their evaluations during the panel. If this method is used again, we recommend including a glossary explaining the particular meanings of the terms on the evaluation form be included in the initial review package for each site.

Panelists left the question regarding preservation of farmland or forestry unanswered the most often by far (n=27 non responses). Perhaps because of their outer beltway locations in the Boston metro area, none of the projects actually had on-site farmland or working

forestry, but we included the question because it was typical of municipal CSD bylaw goals. We do not view this question as a reliable one. Panelists also said that while the information they had was sufficient for their evaluations, it was just barely so—more pictures and video of the open spaces and project infrastructure more clearly keyed to the project maps would have made the evaluations easier and perhaps more valid.

While there is a significant increase in validity in having more than one person rate the outcomes of projects (as in the panel approach above), there is a significant cost in terms of resources. In comparison, Dotson utilized a more straight-forward method of constructing his own evaluation criteria based on reference to general good planning principles. This has somewhat less validity in that the approach lacks development of shared rationality, which can be an important way to validate what are otherwise essentially subjective issues like project quality; however, this approach is much easier to conduct and complete and could allow for a greater sample size. In a similar vein, one could develop a set of performance criteria such as stormwater runoff rates etc. to very systematically evaluate the environmental outcomes of the project. The challenge would be gathering sufficient data to actually achieve this.

Findings

Research hypothesis A (Open space v. other goals)

HA0: Among the wide range of municipal goals that CSDs could achieve, those associated with open space will have the best outcomes.

Generally, this hypothesis proves to be true. To test it, we averaged the results for our nine sample projects by evaluation question in Table 3.

[See Table 3 Page 21: Average Results by Evaluation Question]

The results demonstrate that CSD projects are particularly effective at most of their open space goals: these projects provided open space access for residents (n=3.75), vistas for both residents and the public (n=3.32 and n=3.25), preserved habitat and/or natural resources (n=3.27) and connected the open spaces to adjacent open space (n=3.42). Items which score less well, but are still above or very near the median (n=3.05) also related to open space: the projects supported off-site environmental functions (n=3.14, usually wetlands and general hydrology according to comments during the panel discussion), and did fairly well providing contiguity of open space within the site (n=3.08).

Panel discussants were particularly thoughtful about the appropriate functions of open space. To them, open space does not just function as wildlife habitat, as is supposed in calls for large contiguous blocks. In rural areas and where projects connect to protected areas, this is probably an appropriate goal. But small pieces of open space can also serve important ecological functions such as stormwater retention and treatment, providing shared community space, improving the connections between nature and residents, and in aesthetics. In particular, in urban areas these smaller pieces can be just as valuable, as there is rarely habitat to effectively protect. Because of this, goals for open space should

take into account the site and community's placement on the urban-to-rural continuum. Ideally, the open space should be designed with an eye on what the future ecology of the area will be—does town foresee the area being built out? If so, smaller pieces of open space designed to bring residents closer to nature and serve stormwater and aesthetic goals are better than trying for large chunk of habitat, given that surrounding areas won't be connected in habitat and corridor networks. This question of creating networks of open space brought forward the point that these projects, to be truly successful, have to be used in connection with master plans. Master plans provide information on the future land use of the area and thus its resulting ecology, and should inform the selection of the most appropriate of open space goals for that particular ecological and land use context.

When the panel considered the physical design of the built structures, the projects did less well. Reviews of the project's creativity, a very common goal in the bylaws, was the median score (n=3.05), minimizing disturbance to topography achieved about the same evaluations (n=3.03), and the projects' ability to minimize street lengths was well below median (n=2.45). Most projects did not provide active recreation (n=2.43), even when broadly defined as an open field suitable for ball playing and similar activities. Comments by panel members provide further insight into these questions. From their perspective, a key outcome from CSD bylaws should be reducing roadways, because that reduces impermeable surface and thus helps aquatic systems. But, water quality is often not a specific goal of the bylaws. Some projects could have used much shorter and narrower roads and thus gotten better environmental outcomes.

In general, the types of goals that can be characterized as public goods scored poorly: public access to open space (n=2.75), maintaining community character (n=2.74), and providing a diversity of housing types (n=1.96). Thus it appears that CSD designs are generally achieving their goals in terms of open space, but have much more mixed results when it comes to other public goods, such as reductions to municipal costs to service roads in the future or overall creative design. Part of the reason for this may be the implicit definition of public goods as items that projects should achieve or provide. Panel members in their discussion of this question presented an alternative definition of what public good should be achieved in development projects: they believed that the most important and most feasible definition of achieving public good in developments is preventing potential harms, mostly to ecological function. There was general agreement that CSD projects did a better job at preventing harms than traditional subdivision would have. Much of this was defined in terms of water quality, and a caveat the panel presented is that given strong wetlands laws, the difference between CSD developments and traditional subdivisions is not that great. This was based on the majority of the panel's belief that preserving the aquatic functioning, both for water quality and for habitat, was the most important criterion for project evaluation, and thus if the same strong regulations apply in both styles of development (as is indeed the case) the difference in outcomes will be minimal.

A point of particular dismay for panel members was the quality of the architecture—all the homes had a generic design typical to any subdivision in any part of the country, and most of the projects featured very large homes. Housing diversity was very low, both in style/size of homes and in anything other than single-family residences. Only one project

included affordable housing, and that was one unit placed next to the adjacent highway. Another project included townhomes, but these were sited with their own road entrance entirely separate from the single family residences, raising a question of whether this really constituted diversity in housing, since each style had their own little enclave.

Research hypothesis B (Public v. private benefits from open space):

HB0: The open space benefits realized by the majority of site designs will be accrue to both project residents and the wider community, through ecological or farmland functionality of the preserved land, connectivity to off-site open space, or public access to project open space.

This hypothesis slices the above data differently, asking not just which open space goals are achieved but whom they most benefit. The primary interest here is in whether the projects tend to provide privatized open space, which may be less important for public incentives, or whether the open space serves the public as well as residents, in which case public incentives to encourage land preservation appear more appropriate. As shown in Table 4, providing physical access to the on-site open space is a low priority for most projects. Even when there was public access, the access was often tucked deep in the development and thus hardly fully public; this is largely privatized open space. Similarly, while some communities may hope that CSD projects will provide active recreation and thus reduce the burden of public provision of soccer fields etc. (Hamin 2007), it appears that this is an unusual outcome for such projects. However, the relatively positive results for environmental goals means that both residents and the larger community receive the broader environmental purposes of the open space.

[See Table 4 Page 22]

Research hypothesis C (By-laws v. project outcomes):

HC0: The quality of the CSD regulations as measured by their specificity has little apparent effect on the quality of the projects built under the bylaws.

This hypothesis also proved to be generally true, although the dependability of the finding is not strong. To evaluate this, as noted earlier and pictured in Flowchart A, we classified the bylaws into four categories of generally decreasing bylaw specificity:

- Category **A**: CSD with four-step process, including which features should be preserved and typically also having design criteria;
- Category **B**: CSD without four-step process, including features which should be preserved and design criteria, but not specifying a particular process;
- Category **C**: Open Space Development, including some features to be preserved but no design criteria;
- Category **D**: Non-conservation cluster, one that does not specify design guidelines or what features are to be preserved (excluded from sample).

The selected case studies included three in each of the first categories, A-C. A clear pattern of higher scores for a category would have given strong support to the connection between quality of that sort of bylaw and quality of project. The results were as follows:

[See Table 5 Page 23: Scores by Project]

The results do not provide clear patterns. The overall scores suggest that specifying specific design features matters little or even hurts project outcomes, given the observation of higher scores for those without specified design features as compared to those with design requirements. Review of the pattern of projects suggests that overall, using the 4-step process helps increase the quality of the built project, however, it is quite possible to do a very average project using the 4-step process, while it is also quite possible to do a very good project using only a requirement for what features are to be preserved. In sum, having strong bylaws did not dependably yield higher quality projects.

To verify whether there were particular aspects of bylaws that correspond with design quality outcomes, we further analyzed the bylaws according to their key content, presented in Table 5, below. No pattern was evident. The best scoring project, F, was built under an older and largely unspecific bylaw that required only 10% open space, with possibility of getting a 50% density bonus for providing more open space, providing age-restricted 2-bedroom units, and meeting design guidelines that were not included as part of the bylaw. Probably the strongest bylaw, for project D, yielded an average outcome. Two projects built with specific design guidelines, I and B, ranked very poorly in terms of quality of design.

Panel members' consensus was that that overall, good designers make good designs regardless of the municipal requirements, and that rather than protecting the towns, excess requirements reduced the flexibility necessary to create good, creative site plans. Similarly, the designers felt the bylaw requirement for the 4-step process was not very important in creating good design, for several reasons. The general process most site planners follow is to first identify site constraints, and then attempt to maximize site advantages; thus, requiring that process is superfluous. Much of what the four-step process puts off-limits is actually off-limits legally (wetlands, rare habitat, etc.). Instead, the numerical findings seem to support a central aspect of the panelists' conversation: good design results from clear guidelines that achieve goals while allowing maximum possible flexibility. While this finding sheds some light on the process, it would be helpful to get the perspective of other parties to the development process—the planning boards, staffs, developers and community members—before feeling fully confident in this finding.

Other factors that are important in determining project quality

Given that bylaw contents were not very predictive in terms of project quality, we then examined other factors. First was whether the size or other issues on the site were critical. Table 6 summarizes the size of the projects and the percent preserved open space; no pattern is detectable. Similarly, we reviewed the projects for whether the sites contained wetlands (all but two did, with both drier sites in the bottom half of the scoring) and whether they were relatively flat (3 sites) or relatively hilly (6 sites); the two

highest-ranking projects are on fairly flat sites, but so is the lowest ranking project. Again, no pattern is evident.

[See Link to Table 6 Page 24: By-law Matrix]

We then undertook a different sort of evaluation---asking whether the better quality projects tended to go into wealthier or otherwise distinct socio-economic communities. These results are presented in Table 7. While not conclusive, they are suggestive. The highest-ranking projects had, on average, the highest community achievement rates in higher education, property values and household incomes. However, there were significant outliers to this—Project E, which got one of the lowest scores, is located in a high income, wealth and education city. Rates of population change as well as base population numbers are similar across categories of projects. The most consistent statistic is that the worst ranking projects came in the towns experiencing by far the fastest growth, particularly over the last four years. It may be that these planning boards and staff are too overwhelmed with projects to review to negotiate very strongly for improved designs. In contrast, the top tier projects are in communities that grew quickly 1990-2000, but whose pace of change slowed over the last four years. These boards and staffs may have accumulated good experience in evaluating designs and asking for improvements in the prior decade, but are not overwhelmed with current applications. While not conclusive, these socioeconomic patterns appear to bear a clearer relation to subdivision design quality outcomes than do the specific bylaw content itself.

[See Table 7 Page 24: Socio-economic characteristics]

Research hypothesis D (Quality of project v. underlying zoning):

HD0: Overall, experts find that the CSD projects are better based on multiple criteria than the projects that likely would have been built if conforming to basic underlying zoning for the site.

The findings on this are strong – HD0 is true. Overall, the panel viewed the CSDs as clearly better than what likely would have occurred under traditional zoning (questions B and D, n=3.36, n=3.38), and somewhat better than the CSD zoning required (n=3.05) so the projects certainly could have been worse. They apparently could have been much better, too—few of the projects would have been included in panel members' portfolios (n=2.26), and the projects were viewed as only slightly better than average for all CSD or cluster projects the panel had seen permitted (n=2.89).

To check the validity of these summative questions, we also asked them in a different way—given the evaluators a chance to 'grade' the idea and designs. These experts gave the CSD concept an A to A-. But, as built, the projects don't live up to the potential in the concept; built projects get more like a B-. To get CSD closer to achieving its potential, the experts argued that the bylaws should go farther on certain issues; in particular, they would like the bylaws to:

- Require more housing design variability, maybe through asking for lots to vary in frontage etc.;
- Push harder on housing diversity and inclusion of smaller/affordable units within the main project, not peripheralized or placed into separate areas;
- Make good hydrological performance a key goal (connect uplands and wetlands, reduce roads and other impermeable surface, better buffer wetlands);
- Require landscaping that specifically included native plants; and,
- Give bonuses or other consideration for using solar power in homes and designing with good solar orientation.

National Panel Findings

To geographically and methodologically broaden the findings, Bruce Dotson, Anna Haines, and Chris Ellis were recruited in 2005 to consider the research/practice issues associated with CSDs in their region. We organized a roundtable at the 2006 Associated Collegiate Schools of Planning Meeting. The Dotson and Haines ACSP papers are attached to this report.[vii] Dotson (2006) developed an external evaluation scheme, and used it to rate thirteen CSD-type developments in Albemarle County, Virginia. He found that the projects have positive outcomes compared to conventional development for environmental goals; in the Virginia cases, this particularly included watershed protection. The site designs, however, repeat the suburban *cul de sac* development pattern but on somewhat smaller lots than underlying zoning. The projects he evaluated tend to abut conservation or protected farmland, and thus may be helpful in reinforcing conservation measures on these adjacent parcels, and in encouraging farming to continue in this developing urban edge. In Albemarle County, the preservation land was not held in common as shared open space by lot owners, and instead tended to be used either as very large home/conservation parcels or for farming. In this high-quality farming area, the apparent function of the clustering is to provide a way for financially-pressed farmers to take advantage of increased property values while retaining some farmland. Of note are his findings regarding the regional location of the developments: they tended to be closer to growth areas and thus in the path of development pressure, and their scattered and exurban locations tend to create rural sprawl.

Haines focused on the regulatory framework within which CSDs in seven counties with 40 municipalities in southeastern Wisconsin are built, noting that this is an under-studied aspect of CSD implementation. She finds a wide variety of permitting processes and conditions; for 40 governmental units, thirteen regulatory approaches were identified. In only one community was CSD the standard development route; 45% of communities used some form of special permitting process for CSDs thus creating typically a more onerous permitting process than the underlying traditional zoning; and for about 25%, CSD was a permitted or required use. Thirteen communities use density bonuses to encourage use of CSD, and about 60% require a land stewardship plan for the preservation land.

Across the three examined areas we can identify similarities and differences. In the Massachusetts, Virginia and Wisconsin case studies, traditional subdivisions far outnumber CSDs, despite many municipalities having CSD ordinances. The diversity of

permitting routes among local governments is similar in Wisconsin and Massachusetts, and in all three CSD is typically only allowed through a special permit processes. The Virginia and Massachusetts studies found significant number of CSDs in the path of development pressure from a larger urban area rather than occurring fully rural areas, but more geographical analysis should be done to verify this general finding. Indeed, all the studies found that more in-depth study of why developments proceed or fail, and the issues underlying the permitting process from both municipal and developers' perspectives would be helpful in fully understanding how CSD has been implemented (or not) in the built form.

An important insight gained from the ACSP panel and these research papers is that the lack of clear criteria is a significant problem in determining what is a good project and what is not. It would be very helpful to have some widely applicable evaluation rubric that could be used not just by researchers, but by cities and towns as they weigh individual projects. The form might be similar to the LEED[viii] green building certification. This program has now been expanded to include certification for neighborhoods under a pilot program begun in 2006 (see http://www.usgbc.org/); criteria for certification include compact development at a minimum of seven units per buildable acre, and location near transit or very close to shopping (key passages from the LEED for Neighborhood Development are included in the appendix). While the scope of current work did not include evaluating the sample projects along this particular rubric, a quick review of the Massachusetts cases suggests that none of them would have qualified for certification. Given that suburban/exurban development forms, including CSD, are unlikely to go away any time soon, it would be very helpful to communities to have criteria that are relevant to suburban development.

Conclusions

What does it take to get a good quality design from a conservation subdivision bylaw? First, the bylaw must exist. The research provides strong support for the value of this sort of development, at least at the site scale. CSD does better achieve environmental goals than traditional subdivisions, and while the recreational benefits are largely privatized to the residents, the ecological benefits are more widespread. These results do not necessarily contradict the characterization of CSD as a 'band-aid for bad zoning' (Daniels 2002). CSD does not change the density of housing at the community or regional scale, only shifts it around on the site. As a result, given that these were all greenfield developments, they contribute to sprawl just as much as any conventional development when considered at the regional scale. CSD in the Massachusetts I-495 region is largely used on sites that are hilly and/or wet, and in a number of cases the preservation land could never legally have been developed. The vagaries of individual bylaws in including environmentally restricted lands in the calculation of what counted as buildable means that in some cases there is an implicit density bonus, although whether or not the municipalities intended this is unclear. In this way, CSD allowed economic construction of marginal sites. In Virginia's Albemarle County, the developments abut farming and conservation land. As such, CSD may encourage construction in some areas that would be better off not built. However, if these areas were going to be built anyway using the underlying very low-density zoning, the CSD projects are better than the

alternative, traditional subdivision. CSD can be seen as effective harm minimization given existing zoning and property rights.

In the long term, 100-year planning perspective, CSD and denser clustering is an important way to preserve flexibility in the landscape, particularly as compared to large-lot development. Given that CSDs are occurring in the path of metropolitan development pressure, as (or if) the communities of which the CSDs are a part mature and densify, it is entirely possible that the land that was legally conserved could be unconserved and available for denser development. Alternatively, as agricultural markets and consumer habit change, these relatively close-in preserved areas could serve as local farms, increasing local access to fresh foods. This sort of urban/suburban farm tends to require much less land than the major commodity farms, and can fit well into the scale of a medium density area. This sort of agriculture thus could be a viable use of isolated parcels of conserved land that do not form into contiguous habitat. And clearly, when the CSDs actually contribute to contiguous habitat, they preserve environmental flexibility in many ways. We might thus be better served to imagine CSD as a form of land banking, with all the complex considerations that implies (Strong 1979). This suggests a more strategic perspective on where and when to encourage this environmental clustering, with more focus on the regional location of the CSD as compared to the current parcel-by-parcel approach.

Overall, planners and related fields have been working very hard in the last decade to more clearly connect places together, to design landscapes that encourage a sense of place, and to seek a higher quality of design for all built structures. One way of understanding the goals of good planning in a variety of contexts is captured in the idea of the transect, where areas can be described on a spectrum from urban to wilderness, and the goal of regulations for each is to create spaces that support the coherent, unique identity of the place wherever it is in transect (Duany and Talen 2002). In this regard, one of the problems with CSD as it has been practiced is it tends to drop moderately dense suburban housing in the midst of the countryside, mixing the suburban form into the rural context and thus creating both visual and functional discord. By design these are isolated projects unconnected to any neighborhood, with residences dependent on automobiles, and with very typical suburban housing design with little or no mixing of housing types or prices. There is nothing that says they must be this way, and it is clearly time that a new imagination is put into designing for the rural and suburban context in ways that achieve many of the goals of CSD—harm reduction, long-term flexibility, environmental outcomes—but also achieve some of the broader goals of good regional and neighborhood design.

In terms of advice to communities in crafting bylaws, several points are apparent. First, if communities really want to achieve the wide variety of goals that are in their bylaws, then the current form of CSD is not up to the task. More layers of design review, requirements for connectivity to nearby neighborhoods, diversity in housing type, etc. will be required if those goals are to be achieved, and it is not clear that there are models out there now that show how to achieve this in a typical development. CSD regulation could be carefully designed to encourage development adjacent to existing development,

and carefully calibrated to municipal open space and master plans so that the preserved lands achieve the long-term flexibility goals noted above while contributing to the quality of the built environment today. In general we would encourage towns to:

1. Carefully review their existing open space and master plans along with information on habitat and soil quality to determine an interconnected network that they would like to see open spaces create.
2. Compare this to neighboring and regional plans to if possible achieve large-scale connectivity across the region.
3. Design CSD as the as-of-right development method in these high-priority preservation areas.
4. Design guidelines so that:
    a. the CSD house lots gather close to the road (with a visual buffer if the town wishes) and connect to neighboring developments
    b. the project achieves hydrological goals along with other locally important environmental or working landscape goals
    c. consider including more of the design elements that would provide housing design diversity and quality while maintaining the character integral to the place.

While having the bylaws is important, it appears that communities are well advised to put significant energy into recruiting high-quality Planning Board members and then providing them with on-going training, and also investing in the best planning staff they can find. Given the broad discretion available to Planning Boards under most special permit situations, the challenge appears to be to get the Planning Boards to believe in their right to insist on good design from developers, to give them general tools to do their job, and provide a system that has learned from past applications and is not overwhelmed with current projects.

Directions for Future Research

This research suggests that there are some very fruitful paths for future research at both a very specific level regarding CSD, and at a broader level regarding suburban/ exurban development models and patterns. The proposals here generally assume that the research will be collaborative with researchers working together across regions, and that we would seek to add a researcher from the West Coast or Intermountain West; some questions could be addressable on a smaller scale.

Generally, the first set of research questions seek to explore more of the 'why' of CSD—the sorts of issues that are explicable only with more qualitative, narrative types of research. Some of these questions are:

- What is the relationship between project quality and process/community and board context such as planning board qualifications, local pace of development, staffing, and socioeconomic conditions in the community? This research focused on bylaws; it would be helpful to run comparative studies focusing on process and staffing questions.

    - Understanding this will help ascertain the best use of resources – is it in developing new/better bylaws, or in training and staffing boards?
- When do developers choose to use CSD and when do they prefer conventional subdivision designs? Why? This research found that while many communities have CSD bylaws, many more projects get built under traditional subdivision rules.
    - Understanding developer motivations and choices will indicate what communities need to do to get CSD bylaws more widely utilized
- Do the planning board members, developers, and community members view the quality of these projects similarly to the evaluation criteria/design judgments of the experts?
    - If not, then that raises interesting questions about how to balance or interweave expert/top-down evaluation with a participatory, bottom-up approach.

The method for these questions would be to interview board members, developers, community members, etc. regarding CSD projects that have gotten permitted, or for which the developer never bothered to submit a CSD design. In Massachusetts, this would likely be the nine projects investigated here, for which we already have extensive background material.

The second promising research area is to refine criteria for evaluating these sorts of suburban subdivisions, whether CSDs or not. The researchers have now pilot-tested three ways to evaluate projects (including Ellis' in-process effort regarding the Woodlands). Each has strengths and weaknesses, and implicit biases. Collaborating to develop a shared set of indicators would certainly allow us to examine and evaluate the results of the work to date, the implicit biases in each scheme, and to design a rubric with technical merit and feasibility. We could potentially liaise with the LEED teams in developing a certification guide for quality suburban/exurban development. These criteria would evaluate the site design, and its placement in the region and its connection to the municipal master plan or open space plan. Part of the consideration here would be to determine legally defensible ways that CSD preservation lands can be linked together to sustain habitat at a sufficient scale, where that is the relevant open space goal. These criteria could be used by the researchers, but more importantly could be transferred to communities to help boards permit better projects.

The method for this approach likely would include convening a working session of the researchers and other experts to brainstorm and outline a solid evaluation rubric. This would build from the work by Hamin and Dotson here, but would be refined and made relevant over different regions. A key issue here is part of the discussion above about the failing in the site designs from a good planning perspective. Perhaps the most difficult part is determining ways that conservation subdivisions can actually contribute to visually and socially coherent suburban and rural communities. Because this is challenging, I view the big-picture design review below to be an integral part of this.

On a parallel track to the work on CSD in particular, I suggest a broader consideration of how to provide for a high quality of community design in our countryside areas. This might involve first the investigation of the spatial patterns of exurban development to

determine trends; identification of prototypical high quality projects that could be emulated that connect residents together while minimizing habitat fragmentation and disturbance to ecosystems; bringing together researchers and planners familiar with suburban/rural conditions —in essence, running a charrette to identify improved land use design patterns for suburban/exurban/countryside communities. With the research on existing CSD in hand, such a charrette would be in a position to design the next iteration of clustering, combining the environmental achievements of CSD with the community design achievements of new urbanism. This could result in a very substantial contribution to the future design of the extensive exurban areas under development pressure now and into the future. I suspect that this charrette may find that CSD is a desirable design form in only limited cases and only in conjunction with zoning tools that encourage interconnected development in village centers and close-in neighborhoods, and thereby combat, rather than create, rural sprawl.

Tables, Maps, Appendix

Map of Survey Respondents and I-495 Metro Boston Belt

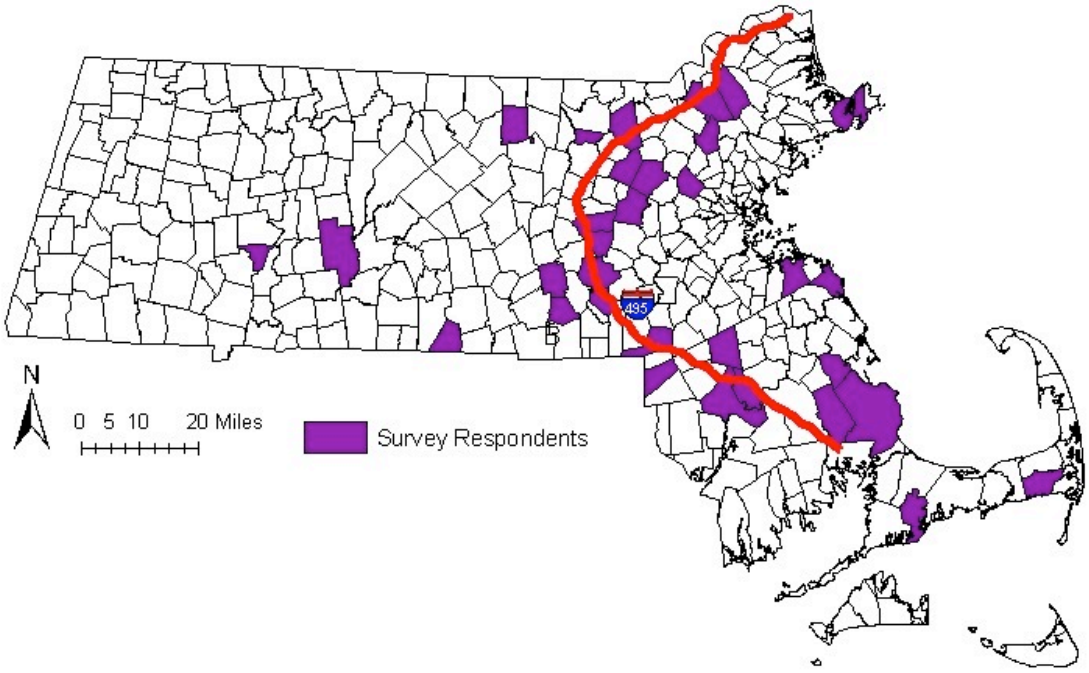

Table 1: Bylaw Analysis

Category Letter	Category Name	Number of Bylaws	Percent
A	CSD with four-step process	23	8.7%
B	CSD without four-step process	85	32.2%
C	Environmental cluster	37	14.0%
D	Non-environmental cluster	119	45.1%
	TOTAL	264	100%

Table 2: Permitting Outcomes in CSD Municipalities

Bylaw category	Number of cities/ towns surveyed	Number of cities/ towns responding	Number that had permitted a CSD	Number of CSDs permitted, 1997-2005	Average # CSDs permitted 1997-2005
A	10	8 (80%)	5 (63%)	30	6.0
B	46	31 (67%)	17 (55%)	111	6.5
C	21	13 (62%)	10 (77%)	25	2.5
Total	77	52 (68%)	32 (62%)	166	5.2

Table 3: Average results by evaluation question for the nine projects

No.	Evaluative Question	Average[1]
11	Provides physical access to the open space for project residents	3.75
9	Connects open space to adjacent open space	3.42
4	Protects scenic vistas for residents	3.32
7	Preserves natural resources/wildlife habitat	3.27
5	Protects scenic vistas for public	3.25
10	Supports off-site environmental functions (e.g. wetlands, conservation areas)	3.14
6	Maximizes contiguity of open space within the site	3.08
2	Demonstrates design flexibility or creativity	3.05
1	Minimizes disturbance to existing topography and vegetation	3.03
13	Provides public access to the open space or recreation areas	2.75
3	Maintains rural or community character	2.74
14	Minimizes street lengths and related utilities	2.45
12	Provides active recreation	2.43
8	Enhances or preserves on-site farming or forestry[2]	N/a
15	Provides a diversity of housing types	1.96
Summative Questions		
A	The project as built is better than the minimum required under the CSD bylaw	3.05
B	The project is better than a traditional subdivision under underlying zoning would be[3]	3.36
C	I would include this in my professional portfolio	2.26
D	Compared to **typical traditional subdivisions** I have seen permitted in various communities, I would call this site plan*	3.38
E	Compared to **typical CSD or cluster plans** I have seen permitted in various communities, I would call this site plan*	2.89

NOTES:
*Scale: 1=Poor, 2=Below Average, 3=Average, 4=Good, 5=Excellent
Summative Scale: 5 = strongly agree, 1 = strongly disagree, N/A = not applicable to this project
[1] n = 54 less the number of non-responses for the individual item (median = 2, range = 1 to 27). Overall median is 3.05.
[2] This question had by far the highest number of non-responses (n=27, next highest =10) and is considered less reliable than other answers. Given their suburban contexts, there was little opportunity for projects to connect with significant working landscapes.
[3] Panel members commented on how little time they spent reviewing the underlying bylaws, so this question may be less reliable than others.

Table 4: Open Space Benefits for Whom?

No.	Evaluative Question	AVERAGE[1]
11	Provides physical access to the open space for project residents	3.75
13	Provides public access to the open space or recreation areas	2.75
4	Protects scenic vistas for residents	3.32
5	Protects scenic vistas for public	3.25
9	Connects open space to adjacent open space	3.42
7	Preserves natural resources/wildlife habitat	3.27
10	Supports off-site environmental functions (e.g. wetlands, conservation areas)	3.14
12	Provides active recreation	2.43
8	Enhances or preserves on-site farming or forestry[2]	N/a

Table 5: Scores by Project

	Bylaw Type	Average Total Score	Average Score	No. Units	Total Acreage	Percent Open Space
Development F	A	55	3.7	7	8	61%
Development H	A	50	3.3	58	108	69%
Development C	C	48	3.3	34	33	48%
Development A	C	45	3.0	73	131	56%
Development D	A	44	3.0	28	41	62%
Development G	B	42	2.8	50	30	35%
Development B	B	40	2.7	84	74	51%
Development E	C	36	2.4	35	16	63%
Development I	B	35	2.4	75	110	59%

Average Scores by Bylaw Category		
	Total	Average
As	148	3.3
Bs	117	2.6
Cs	129	2.9
Note: n=3 for each category		

Click Here to View Table 6, Bylaw Matrix

Table 7: Socioeconomic characteristics of sample towns

Project #	Score	Median HH income	Median Prop value	Percent w/ bachelors degree or higher	Change in pop 2000-2004	Percent change 1990-2004	Percent change 2000-2004
F	3.70	$98,272	$278,500	56.8%	721	31.0%	3.5%
C	3.30	$72,728	$316,500	50.3%	777	22.8%	2.9%
H	3.30	$69,114	$221,200	39.6%	762	16.4%	3.4%
A	3.00	$50,457	$161,200	23.7%	700	3.8%	5.3%
D	3.00	$70,652	$221,900	31.4%	205	22.2%	1.0%
G	2.80	$56,879	$190,600	35.6%	1,444	18.5%	4.0%
B	2.70	$56,020	$183,500	34.8%	1,403	25.0%	9.4%
E	2.40	$91,624	$332,400	69.3%	329	15.6%	1.6%
I	2.40	$60,449	$174,000	23.3%	1,585	35.0%	13.5%
Average Scores							
Top 3	3.43	$ 80,038	$ 272,067	49%	753	23.4%	3.2%
Middle 3	2.93	$ 59,329	$ 191,233	30%	783	14.8%	3.9%
Bottom 3	2.50	$ 69,364	$ 229,967	42%	1,106	25.2%	8.4%

Source: U.S. Census Bureau, 2004 Population Estimates, Census 2000, 1990 Census

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LEED for Neighborhood Developments
Rating System - Preliminary Draft
September 6, 2005

Presented by the partnership of the Congress for the New Urbanism,
the Natural Resources Defense Council and the U.S. Green Building Council

Prerequisite: Transportation Efficiency
Intent
Reduce air pollution, energy consumption, and greenhouse gas emissions generated by transportation by encouraging new development in locations that reduce automobile dependence. Promote public health by encouraging new development in locations that provide increased opportunities for walking.
Requirements
(1) Locate the **project** on either an **infill site** or on a **previously developed site,**
OR
(2) Locate the project near existing or planned **adequate transit service** so that a majority of dwelling units and business entrances within the project are within ¼ mile **walking distance** of publicly available bus transit service or within ½ mile walking distance of adequate rail, light rail, streetcar, or ferry transit service. In the case of planned service, show that the relevant transit agency has committed in a legally binding warrant that adequate transit service will be provided at or before the beginning of the transit agency's first service year after 50% of the units within the project are occupied and has identified all funding necessary to do so.
OR
(3) Locate the project near existing neighborhood amenities and services so that the project boundary is **adjacent** to existing development and located within ¼ mile walking distance of at least four or within ½ mile walking distance of at least six examples of the following uses, which must be existing and operational at the time of the project's first application: police/fire station; bank; post office; place of worship; park; library; school; convenience store; laundry/dry cleaner; other neighborhood-serving retail; medical/dental office; other office building or major employment center; stand-alone pharmacy; restaurant; supermarket; community or civic center. Uses may not be counted in two categories, e.g., an office building gets counted only once even if it is also a major employment center, and a store of any kind gets counted only once even if it has a diverse line of products and services. But a mixed use building housing several of the above services as distinct enterprises would count each as a separate use.
OR
(4) Locate the project in a zone where research demonstrates that rates of driving per resident are lower than the average rate for residents of the metropolitan region as a whole. (p. 11)

Prerequisite: Compact Development
Intent
Conserve land. Promote livability, transportation efficiency, and walkability.

Requirements
(1) Build residential components of **project** at an average density of seven or more dwelling units per acre of **buildable land** available for residential use
AND
Build commercial components of project at an average intensity of a floor area ratio of 0.50 or greater. (p. 49)

From: LEED for Neighborhood Developments Rating System - Preliminary Draft September 6, 2005, p. 11, available at: http://www.usgbc.org/; downloaded 2/11/07.

Notes

[i] For example, the American Planning Association recommends conservation subdivision design (CSD) as a way to protect important habitat; see http://www.planning.org/policyguides/endanger.htm. The Massachusetts Audubon North Shore office has facilitated a collaborative effort to get all North Shore municipalities to adopt CSD bylaws; see http://www.greenneighborhoods.org/site/Alliance.htm and (forthcoming), and Dotson (2006) and Haines (2006) find that CSD bylaws are on the books in many municipalities in different states.

[ii] It is appropriate here to note my own biases. The CSD idea was first fully described during Arendt et al's tenure at the University of Massachusetts' Center for Rural Massachusetts, with which I am also affiliated. I have written elsewhere (Hamin 2006) that a careful reading of CSD bylaws suggests that they may provide little clear public benefit while providing developers significant density bonuses—I thus did not begin the project as an advocate for this design style. That article was about just one project, and my interest in whether it was just a particularly bad example of CSD sparked this research. The research finding here that CSD has significant value thus runs counter to my initial expectations, although the complexity of the relationship between bylaws and outcomes was something I thought we might find. My department, overall, has strong support for CSD, particularly given that it was the first place that idea was concretized. This may have had some influence on the panelists as several were trained at or are faculty of the department, although my experience of the panelists suggest that they are well practiced in thinking for themselves.

[iii] See results in section below for typical ordinances/bylaws.

[iv] In Massachusetts, city laws are called ordinances, while town laws are called bylaws. Bylaws are adopted at Town Meeting and require review and approval by the State Attorney General's office before they can be officially enacted. Ordinances are adopted by City Councils and do not require state review. In Massachusetts, 39 of the 351 municipalities are cities, thus the vast majority of municipal regulations are bylaws. In this paper, for the sake of brevity, the term bylaw is meant to include both bylaws and ordinances.

[v] Cluster development was broadly defined as any regulation that allows for a reduction in minimum lot/parcel area per dwelling unit in exchange for a certain portion of the overall tract being permanently preserved as undevelopable open space. This definition encompasses traditional cluster and open space residential developments bylaws, as well as less conventional approaches such as planned unit development. The primary search term used was "open space." Variants such as "common land," "open land," and "common space" were used as well. The searches yielded bylaws with a variety of names, such as Cluster development, Open space residential development, Flexible development, Conservation subdivision design, Planned residential development, and Major residential development, among others. As a means of double-checking, these bylaw names were also used as search terms, and the results compared against the list obtained from searching for "open space" and its variants.

[vi] We judged that it would be very difficult to get survey responses from communities without professional planning staff.

[vii] Ellis' work is on-going, and examines the use of clustering and open space over time in the planned community of the Woodlands.

[viii] The potential usefulness of a LEED rating program and conservation subdivision designs was first suggested by Chris Ellis of Texas A&M.