VOL. 2, NO. 5 NOVEMBER 2002

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- ***Costs of converting farm land to residential uses include disruption of farming, higher taxes on other properties in the communities affected, and distance-related safety hazards for the new residents.***
- ***Subdividing farm land for residential use imposes direct cost increases upon adjacent farming operations.***
- ***Most rural subdivisions in the study areas did not pay enough taxes to cover the added costs they impose on schools and road maintenance agencies and thus impose a net added burden on other, existing taxpayers.***
- ***Response times for police, fire, and emergency medical services are substantially longer for homes located in rural subdivisions.***
- ***The Illinois courts have permitted county zoning provisions designed to minimize the negative consequences of rural residential development.***

NORTHERN ILLINOIS UNIVERSITY

issue: *New Homes in Rural Areas: Agricultural, Fiscal, and Public Safety Impacts*

J. Dixon Esseks

Editor's Note: Illinois is home to some of the most productive agricultural land in the world. Its combination of ultra-rich soils, normally good precipitation, highly skilled and well-equipped farmers, and access to foreign markets via the Illinois and Mississippi rivers makes it a key supplier of the world's food for human and livestock consumption. Yet, with its proximity to major population centers, especially the Chicago metropolitan area, this land is also facing intense demand for urbanization – for use as sites for new homes, roads, factories, and shopping centers.

Professor J. Dixon Esseks has spent more than a quarter of a century studying the impact of urban development on farmland from the farmer's and taxpayers' perspectives. Professor Esseks presents findings from his research in this, the first of several *Profiles* looking at problems associated with the conversion of land to urban uses.

The continued population growth forecasted for the Chicago Metropolitan Area will inevitably cause the loss of much good farmland as it is converted into housing, commercial, industrial, and transportation uses.

The explanation is simple. As reported in the most recent (1997) Census of Agriculture, almost half of the total land in the nine-county area (comprised of Cook, DeKalb, DuPage, Grundy, Kane, Kendall, Lake, McHenry, and Will counties) was still farmed in 1997. As demonstrated by the rates of farmland conversion reported in Table 1 (next page), the percentage of land in the area still used for agriculture can be expected to drop significantly, especially in Kane, McHenry, and Will counties, which are each predicted to increase in population by more than 150,000 persons between 1990 and 2020.

In 1997, agricultural land in those three counties accounted for 55 to 63 percent of total acres. Much or most of that farmland being converted is likely to be highly productive. The acres considered to be "prime" for agriculture comprise about 66 percent of the total land remaining in farming in McHenry County, 70 percent in Will, and 78 percent in Kane.

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Are there benefits to such conversion?

There are benefits to the conversion of agricultural land to residential and other urban uses, but these may be only short-term in nature and are apt to accrue mostly to those who live in the new housing built on the former agricultural land (as well as to the land's developers). People are housed, probably at lower costs per acre, especially when the land values do not reflect the long-term value to society of the farmland that was consumed. Many buyers prefer rural or small town sites for their homes, and, as some other writers have observed[1], buyers of exurban homes can now enjoy amenities previously restricted to urban and suburban locations. They have safe drinking water thanks to modern wells, adequate wastewater treatment by means of on-site septic systems, good television reception through satellite dishes, and many shopping opportunities via specialized catalogs and the Internet.

What are society's costs for building homes in rural areas?

There are three potentially major cost categories that were studied by Northern Illinois University between 1979 and 2001.

- *Disruption of farming:* The cumulative loss of farmable land may be significant. Table 1 shows that across the nine counties of Chicago's metropolitan area, in just five years—between the 1992 and 1997 censuses of agriculture—the decrease in land in farms averaged 3.4 percentage points. For individual farmers who used to lease land that has been converted, the loss may be hard because their farming operations' viability depends on having an adequate amount of owned and rented farmland acreage. Also suffering may be farmers who operate next to land that someone else has sold for residential development. They may be forced to change farming practices in response to complaints from their nonfarmer neighbors about dust, smells, noise, and other nuisance byproducts of agriculture. Those neighbors may also vandalize farm equipment or damage crops (e.g., trampling by trail bikes or flooding due to uncontrolled storm water runoff from subdivision roofs, patios, driveways, and roads).

- *Fiscal costs caused by long distances and low-densities and shouldered by all taxpayers in the service jurisdiction.* The new residences scattered across unincorporated areas may be so far from schools that the busing costs average more than those homes generate in tax revenues to pay for that service (plus the in-school costs). And their densities along rural subdivision streets may be too low for their contributions to road maintenance services to cumulate to the full costs per mile of taking care of the new roads.

- *Distance-related safety hazards incurred by the new, rural residents themselves.* The residents may wait excessively long times for emergency medical services, fire departments, and sheriff's police to respond to their calls for help.

tableone

Chicago Primary Metropolitan Statistical Area: Total acres, total acres in farms, and farmland as percent of total acres (by county)[1]

County	County's Total Acres	Total Acres in Farms (1997)	Farmland as Percent Total Acres 1992	1997
Cook	605,231	39,410	6.8	6.5
DeKalb	405,876	368,076	93.0	90.7
DuPage	214,043	17,103	8.5	8.0
Grundy	268,887	201,452	83.9	74.9
Kane	333,248	209,941	61.1	63.0
Kendall	205,219	167,486	86.8	81.6
Lake	286,582	50,901	25.5	17.8
McHenry	386,654	242,484	64.5	62.7
Will	536,847	293,526	60.6	54.8
Total	3,240,590	1,588,382	Av. change = minus 3.4 pct. points	

[1]Source: U.S. Census Bureau, *Census of Agriculture, 1997* (available at http://www.nass.usda.gov/census (accessed November 14, 2002).

Since all three kinds of costs were likely to be more serious in unincorporated areas, the research emphasized those locations, although one of the five studies reviewed below compares fiscal and safety effects of new homes in both incorporated and rural areas.

How much new housing development is occurring in rural areas?

Table 2 shows that, in the last half of the 1990s, the unincorporated portions of Kane, McHenry, and especially Will counties accounted for significant percentages of the total building permits issued per county for single-family homes—from 11 percent to 26 percent. However, in Will County that share peaked in 1996 at 26.4 percent and declined to 7.7 percent by 2001. The rural share of the absolute numbers of that county's permits decreased from a high of 1,345 in 1996 to only 544 units five years later. There were peaks and declines in Kane and McHenry counties, too, but not as dramatic.

Research into the costs of conversion of agricultural land to residential and other urban uses found that the three types of significant costs are occurring.

What are the direct costs of rural subdivisions to farming operations?

Investigation of this question started in 1979 at the request of the DeKalb County Planning Department. The request came in response to concerns of farmers about the threat to production agriculture that they believed rural residences posed. The research was supported with two grants from the U.S. Department of Housing and Urban Development to help the county plan for managing growth that was predicted to extend westward from the Chicago Metro Area. One study, conducted in 1980, focused on 18 subdivisions in unincorporated parts of the county. Those 18 comprised the full number of eligible cases at that time in the county (that is, developments with at least 10 homes located next to 10 or more acres of farmland, but not adjacent to any incorporated village or city and not sharing a boundary with properties in any unincorporated hamlet).

Operators of 36 of the 40 separate farms that bordered on those 18 developments were interviewed for the study. The fact that there were more than twice as many adjoining farms as there were developments points to the potential for rural subdivisions to trouble multiple farmers. Unlike developments located in incorporated areas, it is less likely that rural subdivisions will have farmland on just one or two sides and other residential or commercial uses on the other sides. A rural subdivision can be completely surrounded by farms.

A third of the 36 surveyed farmers reported cases of trespassing from the subdivisions that resulted in vandalism (e.g., damage to fences or of equipment parked in fields), theft (such as of tools), and destruction of crops (by mini-bikes or horses). Sixty-one percent said the subdivisions caused them to modify their applications of agricultural chemicals. Among the changes were: spraying only "when winds are blowing away from the subdivision or on calm days;" no spraying at all of the first few crop rows in from the subdivision boundary; and hoeing or spraying by hand the fence lines between their fields and the subdivisions. Thirty-nine percent had to remove litter or trash deposited or blown on to

table*two*

Unincorporated areas' shares of total residential building permits for single-family homes in Kane, McHenry, and Will counties: 1995 through 2001[1]

County	1995	1996	1997	1998	1999	2000	2001
Kane[2]	12.8 (431)	14.9 (487)	12.4 (402)	13.6 (494)	14.2 (609)	13.2 (573)	11.3 (534)
McHenry[3]	12.5 (358)	15.9 (370)	16.9 (303)	12.7 (314)	11.0 (320)	8.9 (294)	8.3 (301)
Will[4]	20.3 (879)	26.4 (1,345)	25.3 (1,176)	21.9 (1,230)	16.9 (1,193)	11.8 (763)	7.7 (544)

[1]Source: Northeastern Illinois Planning Commission, "The Number and Value of Housing Units Authorized by Residential Building Permits in Northeastern Illinois" (available at http://www.nipc.cog.il.us/permits.htm (accessed October 20, 2002).

[2]Included in these totals were building permits issued for the small municipalities of Burlington, Hampshire, Lily Lake, Pingree Grove, and Virgil.

[3]Included permits for Greenwood, Ringwood, and Trout Valley (from 1996).

[4]Included permits for Symerton and Homer Glen (from 2001).

their fields from the subdivisions, in order to avoid damage to field equipment or adulteration of harvests. Twenty-two percent reported financial losses due to storm water from the neighboring houses. One case involved a farmer who lost two to three acres of crops that were drowned by run-off from subdivision roofs, driveways, and patios. Another case involved the loss of two acres to a grassed waterway the farmer had to install because of a culvert that emptied from the subdivision onto his field. Two cases reported the needed expenditure of $500 and $1,500, respectively, to re-tile fields to accommodate drainage from septic systems.

This 1980 study was followed by a larger survey, conducted in 1982 and early 1983 with support from the Joyce Foundation. It surveyed 281 operators of a random sample of farms located next to rural subdivisions in three counties of the Chicago Metro Area: Kane, McHenry, and Will. To qualify, each farm needed to have at least ten actively farmed acres situated adjacent to subdivision with a minimum of five completed homes. The surveyed farmers were asked if they had experienced any of nine types of incursion or "trespassing" problems attributable to the adjacent subdivisions (see the list in Table 3).

Almost a third (32.8 percent) of the respondents reported that humans, horses, trail bikes, or other motorized vehicles from the subdivisions had trampled their crop to more than a "slight" degree (Table 3). Thirty-two percent said that subdivision trash or litter on their fields caused non-trivial amounts of clean-up work for themselves or damage to their equipment or harvests; 18.5 percent blamed storm water runoff from the adjoining homes or their subdivision streets for washing away seeds or drowning crops; and 16.4 percent attributed to the subdivisions damage to drainage tiles or ditches that served their farm fields. Smaller percentages reported significant problems of five other kinds. And a total of 63 percent had experienced at least one of the nine types of problems.

Although this study measured perceptions of problems rather than physical evidence, a separate set of findings added plausibility to the survey data. Property tax records indicated how many subdivision homes were adjacent to each respondent's farm fields. The greater the number of those homes, the more likely the surveyed farmers were to report "more than slight" problems with trash and litter, drainage, and trampling of crops.

Other studies yielded similar findings. A survey of over 1,300 farm households in New Jersey found that "trespass and vandalism was the number one concern of the surveyed farmers." Interviews with planners and other expert observers in 16 California counties yielded examples of litter, vandalism, and theft (of vehicle batteries, aluminum irrigation pipes, and orchard crops, among other items of value).[2]

In short, subdivisions adjacent to farmland increase the production costs of the farmers working those lands. These findings supported DeKalb County's land-use planning goal of "Encouraging growth to occur in and adjacent to existing municipalities."

tablethree

Percent of farmers operating next to a random sample of rural subdivisions in Kane, McHenry, and Will counties who attributed more than a "slight problem" to an adjacent subdivision (1982-83 survey), by type of problem

Type of "More than Slight" Problem	% Reporting
Trampling of crops	32.8
Trash or litter on farm fields	32.0
Crop losses due to storm water runoff	18.5
Damaged drainage tiles or ditches	16.4
Vandalism of farm fences or buildings	10.7
Vandalism of farm equipment or vehicles	6.8
Subdivision residents plant gardens, shrubs, or trees on farmer's land	6.0
Injury to livestock	3.2
Theft of property	1.0
Experienced at least one of the above nine types of problems	63.0
Total respondents	**281**

Do rural subdivisions increase the tax burdens of other rural residents?

DeKalb County government officials suspected that rural subdivisions, in addition to being burdens to adjacent farmers, did not pay for themselves fiscally. The extra distances that school buses and other service vehicles traveled to reach them suggested relatively high service costs per home, while the large lot sizes might mean too few homes along subdivision roads to cover those additional distance-related costs. The county thus commissioned additional research to "project the likely flows of public costs and revenues resulting from subdivisions proposed for unincorporated parts of the county."

The resulting study focused on five public services provided by local governments to rural subdivisions:

1. Kindergarten through high school public education.
2. Maintenance of public roads.
3. Police protection.
4. Fire protection.
5. Emergency medical service.

The cost and revenue coefficients (per new home, per pupil, per mile of maintained road, etc.) derived from studying the records of service providers were applied to a hypothetical 80-unit subdivision. Projections for the first four years of development found that the schools and road-maintenance districts would lose considerable money, much more than the combined surpluses of the other service jurisdictions. The county government used these findings to defend successfully its long-term zoning policy of refusing to approve rural subdivisions not sited close to existing municipalities.

Faced with litigation challenging its land use policies, in the late 1990s, the county needed further hard evidence to support its position. With grants from both the Joyce Foundation and the Gaylord and Dorothy Donnelley Foundation, the university conducted cost-revenue analyses of new single-family homes constructed, 1990 through 1995, both within two municipalities (one in Kane County and the other in McHenry County) and in unincorporated areas outside those cities.

The studied service functions were again public schooling, road maintenance, police, fire protection, and emergency medical services. In this study, too, the schools and the township road maintenance districts tended to lose money on the rural homes. Among the four school districts in the study, one which served only high school students was found, in the 1996-97 school year, to enjoy a modest annual surplus per new rural home of $414. For another district with only elementary school students, a small deficit of $72 per home was calculated, while for the two remaining districts (a rural elementary district and a consolidated elementary and secondary school district serving both the municipality and surrounding areas), the estimated deficits exceeded $1,100 per home annually.

In all cases the higher costs of busing students from new rural homes were not trivial, resulting largely from significant differences in the length of the school bus routes. For example, the routes serving new rural homes in an elementary district averaged 34 miles per day more than the average for new homes in the adjacent municipality. In a second, more compact district, the corresponding difference was 9 miles each day.

Another, related cause of the deficits incurred in serving rural students was that their buses tended to have smaller numbers of assigned passengers per bus. If, instead, their passenger loads had been as high as those for the city routes, the starting times for the rural routes would have had to be excessively early in the morning in order for the buses to arrive at the school campuses by the start of classes.

Were road maintenance costs higher for rural subdivisions?

In two township highway districts that had municipalities within their boundaries, not a single rural subdivision road included in the study sample covered its maintenance costs with tax dollars generated by the adjacent homes. The relatively high average frontages per new home (such as 210 feet) did not allow enough dwellings per mile of maintained road to generate sufficient revenues. In a group of three other townships (each without a significant incorporated area), 64 percent of the studied road segments paid their own way. In the last of the six townships studied, 47 percent covered their costs.

One cause of the difference was that the two townships with sizable municipalities had higher average costs per mile compared to the largely rural townships. Residents of those cities enjoyed the road maintenance service which they helped finance for new rural homes only if they traveled out to the new subdivisions,

since their own municipal governments maintained streets inside the city boundaries. Their subsidy of rural subdivisions might have been justified if the new rural homes tended to be humbler than the city counterparts. However they tended to cost more than, or almost as much as, those built in the municipalities during the same time period (1990-95).

What are the implications of rural subdivisions for public safety services?

Whether or not new rural home sites enjoy fiscal subsidies from properties in nearby municipalities, they are likely to experience longer response times when they call for emergency services. In most cases, the physical locations from which those services respond – fire stations, patrolling sheriff's police, and the headquarters of emergency medical services – are farther away. In both the Kane and McHenry county study sites, sheriff's police usually responded to calls for assistance by means of cars engaged in routine patrolling, but not necessarily in that part of the county. The fire and emergency medical services were stationed in the closest municipality. However, while the Kane services were 24-hour, the McHenry emergency medical staff were normally at the station only 15 hours per day; and the fire protection came from volunteers responding to calls from their homes or places of work. The municipalities were served by their own police departments.

table*four*

Comparisons of average waiting times for residents of new homes who called for emergency services (medical, fire protection, and police): Recorded time (in minutes) between when calls for service were received and when service staff reported arriving on scene—in two pairs of municipal and rural sites (Kane and McHenry counties, varying periods in 1990s)*

Sites	Emergency Medical	Fire Protection	Police Service
Rural Kane site	7.0	6.9	17.9
Adjoining Municipality	6.2	5.2	7.6
Rural McHenry site	9.6	15.0	25.3
Adjoining municipality	6.4	12.2	4.1

*Time periods for these averages varied according to available records on response times. The shortest comprised 28 months (January 1995 through May 1997), and the longest was six calendar years (1990-95).

Table 4 displays the differences in average waiting time for (a) new rural homes versus (b) those that were built in the same time period in the nearby cities and that were served by the same fire protection and emergency medical services (EMS). Also shown are the comparisons of the average intervals between the recorded receipt of calls for police service and the officers' reports to dispatchers that they had arrived on scene.

In the Kane County cases, the residents of new rural homes waited on average less than a minute longer for emergency medical service to arrive and almost two minutes longer for fire trucks. The likely explanation for these modest differences is that the municipal government had built a fire/EMS station at the city's western edge, and most of the sampled rural calls for service came from homes in the western part of the service area.

By contrast, the studied calls from the new rural homes in the McHenry County site were more dispersed; and the approximately three-minute disparities in average response times reflected that difference. Another explanation is that the emergency medical service in that part of McHenry County typically had no response staff at the station from 8 o'clock at night until 5 a.m. and, as already mentioned, the separate fire station depended on off-site staff at virtually all times. People moving to rural areas or small towns in largely rural locations should not assume that such services would be otherwise provided.

In both the Kane and McHenry study sites, new rural homes waited much longer, on average, for police services than did their counterparts in adjacent municipalities (Table 4). Sizable differences emerged even when the calls were

categorized into likely emergency situations requiring immediate responses (e.g., possible crime committed or in progress) versus non-critical situations (e.g., nuisance complaints). The county sheriff's departments responsible for all unincorporated areas simply did not have enough staff to compete with municipal departments serving only 3.4 square miles in one case, and 10.2 square miles in the second.

While the differences in response time may have represented risks which the purchasers of new homes in rural subdivisions were willing to assume, the longer response times also indicates the presence of added burdens on service agencies typically understaffed and only marginally able to accept the added responsibilities.

What is the potential impact of this research on county zoning practices?

Through the zoning policies originating in the 1970s which gave initial impetus to this research, the DeKalb County Board sought to minimize the negative consequences of rural residential development by insisting that both subdivisions and individual new homes be sited mostly within or adjacent to municipalities. Its 1991 *Comprehensive Plan* reiterated that policy: "Concentrating development . . . is less expensive, more efficient, protects farm land and reduces conflicts between incompatible uses."

In response to a 1997 court suit challenging the policy, the county introduced testimony regarding both the likely problems for adjacent farming if a proposed 76-unit subdivision were built in an agricultural area, and the anticipated excessive response times for fire and emergency medical services (EMS). The site in question was 4.8 miles from the nearest fire/EMS station. The court ruled in favor of the county and its zoning practices.

Research on zoning programs designed to protect agriculture in other states, such as California, Oregon, and Pennsylvania, indicates that keys to successful zoning seem to be – as found in the DeKalb County case – maintaining support from the farming community and starting the zoning policies early enough before land prices in the protection zone are inflated and owners fight zoning restrictions "tooth and nail" to save their investments. Among the ways to win and sustain acceptance from farmers were: limiting the zoning restrictions to very productive land that is normally profitable to farm, allowing some development on marginal land within the protection zone, permitting new homes for farmers' close relatives but not for hobby farming, and periodically reviewing the zone's boundaries to adjust for increased need for land which can be developed in response to pressures for urban growth.

A future issue of *Policy Profiles* will provide more information on these zoning practices.

[1] Judy S. Davis, Arthur C. Nelson, and Kenneth J. Dueker, 1994. "The Exurbs and Their Implications for Planning Policy," *APA Journal*, 45 (Winter): 45-59.

[2] Judith Lisansky and George Clark, 1987, "Farmer-Nonfarmer Conflicts in the Urban Fringe," a chapter in *Sustaining Agriculture Near Cities* (Ankeny, IA: Soil and Water Conservation Society), edited by William Lockeretz, p. 223.

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