CHAPTER 3
Housing as a Driver of Land Use

As noted in the previous section, loss of land in Massachusetts to development, particularly loss of wildlife habitat, is driven primarily by residential development. As we also saw in the previous section, almost half of the land going to residential development went to low-density, single-family housing with lot sizes of one-half acre or more. Since housing is such an important factor in land use, we need to look at what is driving the overall level of housing construction as well as the characteristics of new construction in the Commonwealth.

Housing and Demographics

The population of Massachusetts grew from 6,022,639 to an estimated 6,427,801 between 1990 and 2002 according to the US Census Bureau, an increase of 6.7 percent. Total housing units grew from 2.47 million to 2.66 million during the same period, or 7.4 percent.

We fit those people and housing units in a relatively small land area: Massachusetts ranks third nationwide in population density at 810 people per square mile, behind New Jersey and Rhode Island, according to the 2000 US Census. Our housing density, at 334 units per square mile, is also the third highest in the US.

The number of households statewide (a household represents all the people who live in a given housing unit) increased at a faster rate, 9.2 percent, than population or housing, between 1990 and 2001. Smaller families, higher divorce rates, and younger people brought into home ownership by low interest rates all are driving the average household size down. Massachusetts saw a 20 percent decline in average household size between 1970 and 2000, from 3.12 people per household to 2.51.

Why does household size matter? Even if house and lot sizes are fixed, a smaller number of people per household drives up per-capita resource consumption. In developing countries, declining household size, and resulting demand for land, fuel, and construction materials, is seen as a greater threat to biodiversity than population growth.[8] In Massachusetts, it demonstrates an additional source of pressure on land resources beyond simple population growth.

Changes in Housing Characteristics: Why Bigger is Not Better

While household sizes are shrinking in Massachusetts, homes are getting bigger and, on average, are being built on larger and larger lots—meaning more and more resources are being consumed per person. The affordability of housing in the Commonwealth has received much media coverage, and is a major concern of the average citizen.[9] Certainly, market forces are at work in driving at least some of the growth in house size. As demand for housing increases, so does the demand for land; and, as land prices increase, there is

pressure on developers to build larger homes in order to generate the same return on investment. Personal taste also is part of the equation because people increasingly want home offices and larger family areas in their homes. Statewide, the average living space for newly constructed single-family homes increased 44 percent between 1970 and 2001 from 1,572 to 2,260 square feet (living area was not available for Nantucket).

One would also expect developers to respond to increasing land prices by increasing housing density—building more units per acre of land. But the opposite has happened. From 1970 through 2002, average lot sizes statewide increased 47 percent. There were wide differences in lot-size growth across counties. While more built-out counties such as Suffolk, Norfolk, Middlesex, Worcester, and Nantucket exhibited relatively little change, Plymouth and Bristol counties in the southeast, Essex in the northeast, and Franklin and Hampshire counties in the west more than doubled, with average lot sizes far in excess of any minimum lot-size requirements.

Drivers of Sprawl: Transportation, Economics, and Zoning

Clearly, something is amiss if average lot sizes are increasing at a time when the market is demanding more affordable housing. Land prices, along with transportation improvements, are driving more and more development into suburban and exurban areas. And often, state and local zoning laws limit the ability to build denser housing in these regions, resulting in sprawl and rapid growth in per-capita land consumption.

Development Hot Spots 2000-2002

Land availability and price play an important role in determining where development occurs. As urban areas and surrounding suburbs are built out, development continues to radiate out in larger and larger circles.

Figure 6 shows hot spots of new housing activity—the 20 communities with the highest number of single-family housing permits, and the 20 with the highest level of multifamily units permitted. Multifamily housing activity tends to be clustered in the inner suburbs and Boston and in some areas with recent extensions to commuter rail lines. New single-family activity is highest in Plymouth, Bristol, Barnstable, and Worcester counties.

Why are we seeing development pressure in these particular communities? The answer lies in a combination of land availability, zoning and permitting, and transportation investments.

Hot Spots of New Housing Construction

2000-2002

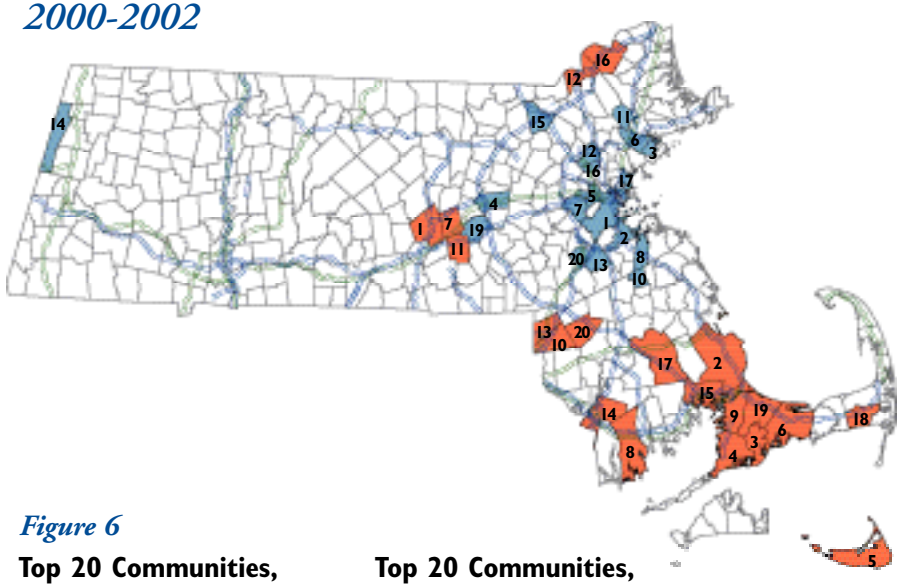

Figure 6

Top 20 Communities, Single-Family Housing Unit Permits, 2000-2002

Rank	Municipality	Single-Family Unit Permits
1	Worcester	957
2	Plymouth	840
3	Mashpee	765
4	Falmouth	688
5	Nantucket	601
6	Barnstable	530
7	Shrewsbury	450
8	Dartmouth	426
9	Bourne	417
10	Attleboro	382
11	Grafton	357
12	Methuen	345
13	North Attleborough	343
14	Fall River	331
15	Wareham	327
16	Haverhill+	326
17	Middleborough	323
18	Harwich	321
19	Sandwich	304
20	Norton	294

Top 20 Communities, Multifamily Housing Unit Permits, 2000-2002

Rank	Municipality	Multi Family Unit Permits
1	Boston	1,977
2	Quincy	673
3	Salem	618
4	Marlborough	572
5	Cambridge	488
6	Peabody	487
7	Newton	469
8	Weymouth	340
9	Haverhill+	266
10	Abington	228
11	Middleton	228
12	Woburn	209
13	Canton	198
14	Hancock	197
15	Chelmsford	184
16	Winchester	170
17	Revere	164
18	Watertown	159
19	Westborough*	156
20	Norwood	147

Hot spots of new single-family housing construction (shown in red) and multi-family housing construction (shown in blue) based on building permits.

+Haverhill was a hot spot for both single-family and multifamily housing permits (shown in red only).

**2000 data missing, 2001 data used. Source: US Census Bureau*

Development Hot Spots and Commuter Rail *2000-2002*

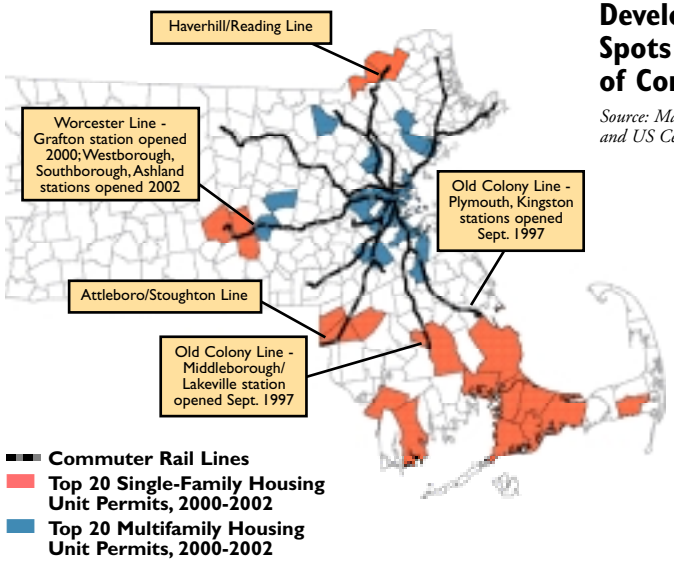

Figure 7

Development Hot Spots and Expansion of Commuter Rail

Source: MassGIS MBTA Rail data and US Census Bureau

Buildout and Sprawl Frontier *2000-2002*

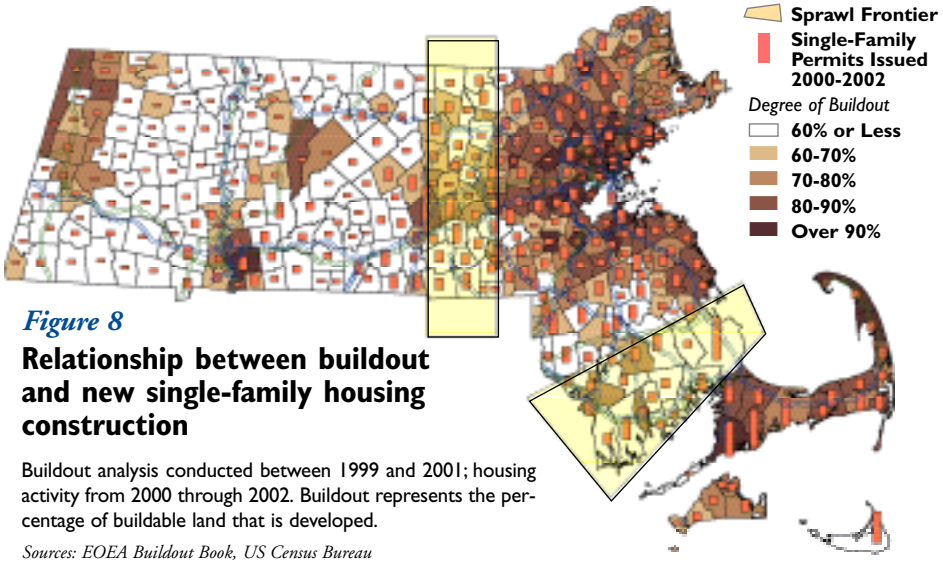

Figure 8

Relationship between buildout and new single-family housing construction

Buildout analysis conducted between 1999 and 2001; housing activity from 2000 through 2002. Buildout represents the percentage of buildable land that is developed.

Sources: EOEA Buildout Book, US Census Bureau

Transportation

The growth of cities and towns in the Interstate 495 corridor has been well publicized, and over half of the top 20 municipalities in single-family housing growth lie within the I-495 or I-190 corridors. **Figure 7** also shows vividly the relationship between new Massachusetts Bay Transportation Authority (MBTA) commuter rail stations and housing growth. Ten of the top 20 cities and towns in new single-family housing growth lie at the terminus of commuter rail lines.

While it is difficult to determine cause and effect here, it is clear that an opportunity was lost to combine regional transportation and development planning. For example, Plymouth approved a mix of housing between 2000 and 2002, including 564 new single-family houses with average lot sizes of 1.27 acres, along with over 100 units of multifamily housing. In contrast, during the same period Middleborough permitted 100 single-family homes with an average lot size of over 2 acres, and only six units of multifamily housing.

Buildout and Land Availability

To understand where the current development pressures are, we looked at single-family housing activity, measured by building permits issued between 2000 and 2002, by municipality. Housing permit data for the period was taken from the US Census. We also looked at the capacity of each city or town to take on more housing, or the degree to which it was "built out" as of 2001. Buildout data was provided for each municipality by the EOEA in 2001 as part of the Community Preservation Initiative, and estimates both current development as well as "buildable" land that may be developed as of right based on current zoning.[10] Buildable land excludes land with constraints to development such as wetlands, conservation lands, and water-supply areas.

Figure 8 shows the relationship between level of buildout by municipality and the number of new single-family residential housing permits issued in the 2000-2002 period. While construction levels remained high on Cape Cod despite high levels of buildout (suggesting ongoing infill and teardown development), high levels of development took place in areas of relatively low buildout west of I-495 and in a band of communities in the lower part of southeastern Massachusetts. This combination of high rates of construction with relatively unbuilt land sets up a "sprawl frontier" pushing its way west and southeast across the state.

Zoning

As we have seen, land economics and state and federal infrastructure investments have their influence on where development in Massachusetts takes place. A third major factor—zoning—also alters the nature of development and is largely in the control of local governments. Zoning and land use affect the types of housing and land consumption that take place at the municipal level. Zoning bylaws and lot-size requirements vary widely across the state, reflecting the varying character and goals of different communities. As of 2000, 96 municipalities had at least some land zoned with two-acre minimum lot-size requirements.

While many rural communities in western Massachusetts require larger minimum lot sizes, land availability in the eastern part of the state has pushed development into our sprawl frontier, which includes many municipalities with large minimum lot-size requirements. Many of these municipalities permit low-density housing exclusively. Several cities and towns with high levels of single-family housing construction between 2000 and 2002, including Dartmouth, Middleborough, Wareham, and Mashpee, had high levels of construction *and* large two-acre zoning districts. Townsend, Pepperell, and Groton had high levels of construction and relied almost exclusively on two-acre zoning.

Where is Sprawl Occurring?

Land supply and demand, public infrastructure, and zoning all play a role in directing growth and determining which municipalities experience high levels of development. Development is needed for the economic vitality of the state and to support a growing population. But not all development is appropriate or well executed.

Figures 9 and 10 show the top 20 communities for each measure of our "sprawl index." In creating the index we compared land consumption between 1991 and 1999 to 80% of the housing or population growth between 1990 and 2000. These cities and towns generally do not have the highest levels of housing construction but are leading indicators of areas of high per-capita land consumption. Our analysis shows "sprawl" clustering in several distinct groups.

- As predicted, high rates of land consumption per new housing unit fell along the "sprawl frontier" running north-south from Pepperell to Uxbridge, with the highest rates of land consumption per housing unit being in the eastern half of Worcester County. Uxbridge,

Sprawl Hot Spots—Acres Per New Housing Unit *1991-1999*

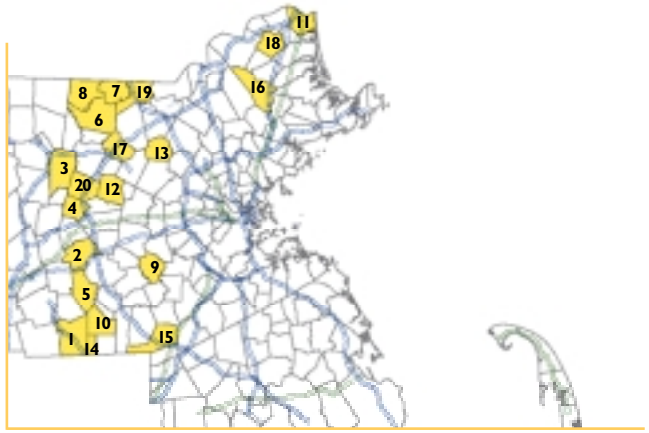

Figure 9

Top 20 Communities Ranked by Acres Consumed Per New Housing Unit

Rank	Municipality	Acres Consumed For Res. Dev. 1991-1999	New Housing Units 1990-2000	Acres Per New Unit	Critical Natural Communities Present
1	Uxbridge	736	127	7.74	
2	Westborough	695	145	6.00	
3	Lancaster	200	46	5.43	
4	Berlin	156	64	3.05	
5	Upton	437	189	2.89	
6	Groton	985	619	1.99	
7	Dunstable	316	207	1.91	
8	Pepperell	627	412	1.90	
9	Sherborn	111	77	1.80	
10	Mendon	612	432	1.77	
11	Salisbury	149	116	1.61	CNC, CSP, RIV
12	Stow	345	275	1.57	
13	Carlisle	192	160	1.50	
14	Millville	147	126	1.46	
15	Wrentham	615	532	1.45	
16	Boxford	588	523	1.41	CSP, PEAT, RIV
17	Littleton	404	364	1.39	
18	West Newbury	295	276	1.34	CSP, RIV
19	Tyngsborough	824	773	1.33	
20	Bolton	399	379	1.32	

CSP=Coastal Sandplain, CNC=Coastal Natural Community, PEAT=Peatlands, RIV=Riverine Community.

Source: MassGIS land use data and US Census Bureau

Sprawl Hot Spots — Acres Per New Permanent Resident *1991-1999*

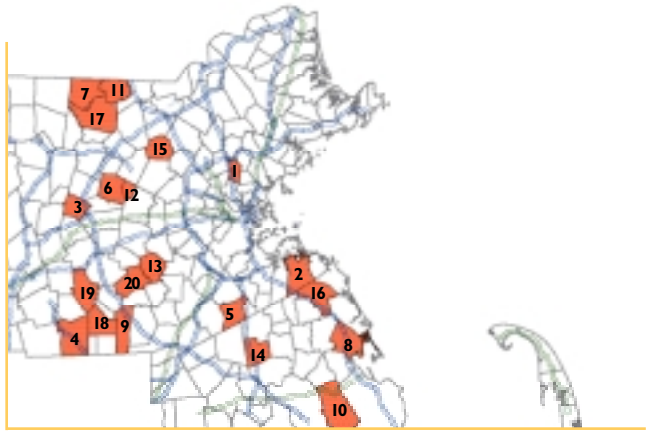

Figure 10

Top 20 Communities Ranked by Land Consumed Per New Permanent Resident

Rank	Municipality	Acres Consumed For Res. Dev. 1991-1999	Population Change 1990-2000	Acres Per New Resident	Critical Natural Communities Present
1	Stoneham	58	16	4.56	
2	Hingham	172	61	3.53	
3	Berlin	156	87	2.25	
4	Uxbridge	736	741	1.24	
5	Stoughton	362	372	1.22	
6	Stow	345	574	0.75	
7	Pepperell	627	1,044	0.75	
8	Duxbury	201	353	0.71	CNC
9	Bellingham	241	437	0.69	
10	Carver	315	587	0.67	PB, CSP
11	Dunstable	316	593	0.67	
12	Maynard	57	108	0.66	
13	Sherborn	111	211	0.66	
14	West Bridgewater	127	245	0.65	
15	Carlisle	192	384	0.62	
16	Norwell	238	486	0.61	RIV
17	Groton	985	2,036	0.60	
18	Mendon	612	1,276	0.60	
19	Upton	437	965	0.57	
20	Holliston	366	875	0.52	

CSP=Coastal Sandplain, CNC=Coastal Natural Community, PB=Pine Barrens, RIV=Riverine Community.

Source: MassGIS land use data and US Census Bureau

Westborough, and Lancaster had the highest rates of land use per new housing unit during the period.

- High rates of land consumption per new permanent resident occurred on the northern and southern portions of the sprawl frontier, as well as on parts of the North Shore and South Shore. Stoneham, Hingham, and Berlin had the highest rates of land consumption per new permanent resident.
- Ten municipalities were in the top 20 for *both* land consumed per housing unit and per new resident: Pepperell, Dunstable, Groton, Carlisle, Stow, Berlin, Upton, Uxbridge, Mendon, and Sherborn.

We continue to lose ground to development in ways that are increasingly unsustainable and inefficient from a land use perspective. As development pushes farther west and southeast, it is increasingly in conflict with some of our most vulnerable natural communities and species. In the next chapter, we will explore whether our land conservation efforts are keeping pace with development.