EXISTING CONDITIONS REPORT

FOR THE LOWER CONNECTICUT RIVER VALLEY PLAN OF CONSERVATION AND DEVELOPMENT 2021-2031

ACKNOWLEDGMENTS

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- Ed Bailey, Frist Selectman (Secretary)
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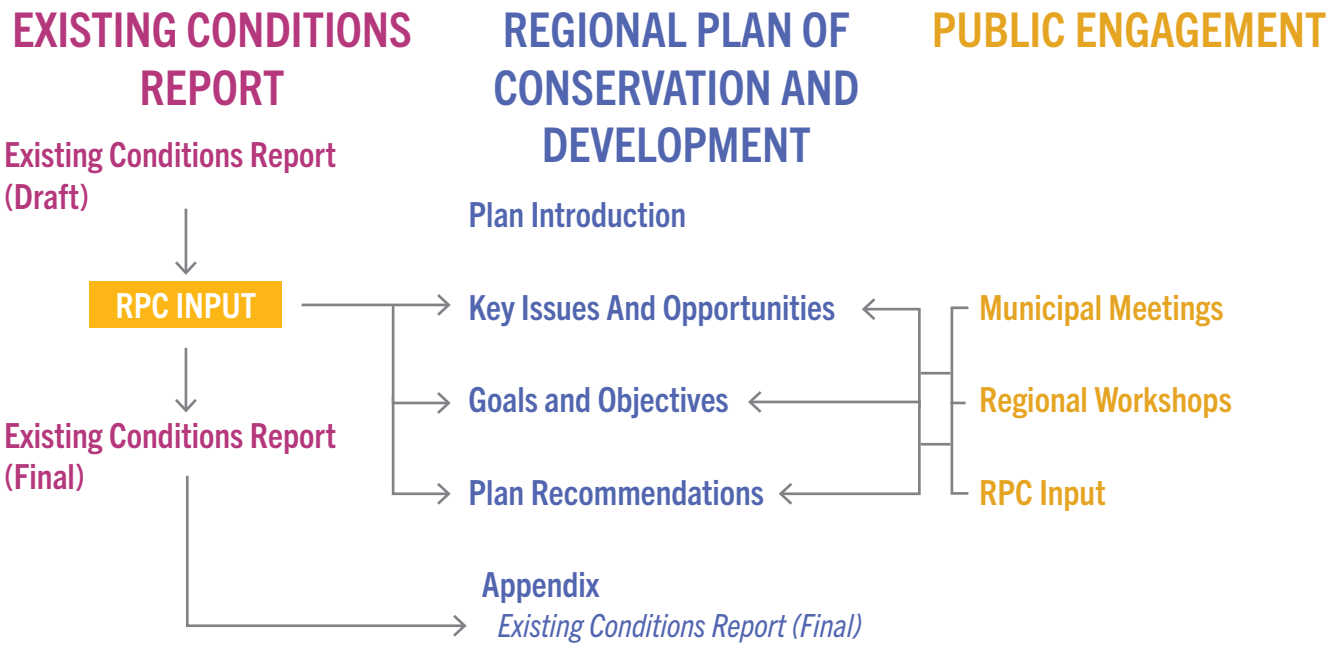
The Lower Connecticut River Valley Regional Plan of Conservation and Development 2021-2031 was made possible by grants from the Connecticut Office of Policy and Management, Federal Highway Administration, and annual dues from RiverCOG Member Municipalities.

WELCOME!

Welcome to the Existing Conditions Report for RiverCOG's Regional Plan of Conservation and Development (RPOCD).

The Existing Conditions Report provides statistical and demographic data for the Lower Connecticut River Valley. This data is analyzed for trends and forms the basis for the goals and recommendations set forth in the Regional Plan of Conservation and Development. Below is a visual depiction of how the Existing Conditions report fits in to the plan's overall framework.



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Cover Photos sourced from RiverCOG:

- Top Left: Information Kiosk at Parmelee Farm in Killingworth
- Top Right: Rowers on Rogers Lake in Old Lyme
- Bottom Left: Outdoor dining on the Connecticut River in Old Saybrook
- Bottom Right: Businesses on Main Street in Middletown

1. INTRODUCTION AND OVERVIEW

1.1 INTRODUCTION

The Lower Connecticut River Valley Existing Conditions Report provides baseline information on existing conditions, opportunities, and challenges in the Lower Connecticut River Valley (LCRV) region. The focus of the Report is on the data, mappable resources, trends, and critical concerns, that will impact land use decisions in the region over the next ten years. The report sets out information regarding historical context, demographics, land use, housing, transportation infrastructure, economic conditions, utilities, and natural resources. The information contained in this Report will be used to:

1. Inform the public, as well as land use policy and decision makers, on planning issues, priorities, and visions for the future;
2. Evaluate policy issues and options; and
3. The report will be used to provide the basis for goals and policies for the LCRV Regional Plan of Conservation and Development.

1.2 REGIONAL PLAN OVERVIEW

LOWER CONNECTICUT RIVER VALLEY COUNCIL OF GOVERNMENTS

The Lower Connecticut River Valley Council of Governments, or RiverCOG, is one of Connecticut's nine regional Councils of Government (also referred to as "COGs"). RiverCOG was formed in 2012 by the merger of two smaller regional planning agencies, Connecticut River Estuary Regional Planning Agency (CRERPA) and Midstate Regional Planning Agency (MRPA).

RiverCOG was created by ordinances adopted by its seventeen member municipalities: Chester, Clinton, Cromwell, Deep River, Durham, East Haddam, East Hampton, Essex, Haddam, Killingworth, Lyme, Middlefield, Middletown, Old Lyme, Old Saybrook, Portland, and Westbrook. The municipal Chief Elected Officials for each of member municipalities serve on the RiverCOG Board. The Board, along with representatives of the region's two bus companies and the Middlesex Chamber of Commerce, also serves as the federally designated Metropolitan Planning Organization (MPO) for the region, responsible for decision making regarding federal transportation funds and for regional cooperation in transportation planning for transportation projects. RiverCOG is also a state designated Regional Planning Organization (RPO), responsible for coordinating regional land use and the creation of a Regional Plan of Conservation and Development.

REGIONAL PLANNING COMMITTEE

The Regional Planning Committee (RPC) is an appointed committee, created by the RiverCOG Board and made up of representatives from each of RiverCOG's 17 municipalities. Several planning responsibilities have been delegated to the RPC, including oversight and review of plans and studies, review of municipal zoning changes for intermunicipal impacts, and oversight of the creation of the Regional Plan of Conservation and Development for Board approval.

1.3 REGIONAL LOCATION AND BOUNDARIES

REGIONAL LOCATION

The Lower Connecticut River Valley (LCRV) region is located in south eastern Connecticut. The LCRV is defined by the Connecticut River and Long Island Sound. The Connecticut River transects the region from north to south, ending in Long Island Sound. The region is made up of seventeen unique municipalities, united by their geographic proximity to these defining natural features. As can be seen in Figure 1-1, the region is generally accessible by Rte. 9 from the north, I-95 from the east and west, and I-91 from the north and west.

The region's seventeen municipalities offer a variety of natural, physical, built, and cultural amenities. Natural amenities, such as beaches, forests, protected open spaces, and trail systems contribute extensively to the character of the region. The built environment in the region is diverse, including rural, agricultural, suburban, and urban settings, anchored by Middletown, the region's only city. The regional economy is supported by a variety of activity centers that range from vibrant historic centers to modern shopping centers and strong manufacturing centers. The region is also home to multiple, diverse tourist destinations, including the Essex Steam Train, Connecticut River Museum, Gillette Castle, the Goodspeed Opera House, the Florence Griswold Museum, the Ivoryton Playhouse, the Lyme Art Academy, the Kate Theater, Brownstone Exploration & Discovery Park, and Powder Ridge Mountain and Ski Resort.

The LCRV region is bordered by several other planning regions: South Central to the west, Capitol Region to the north, and Southeastern to the east.

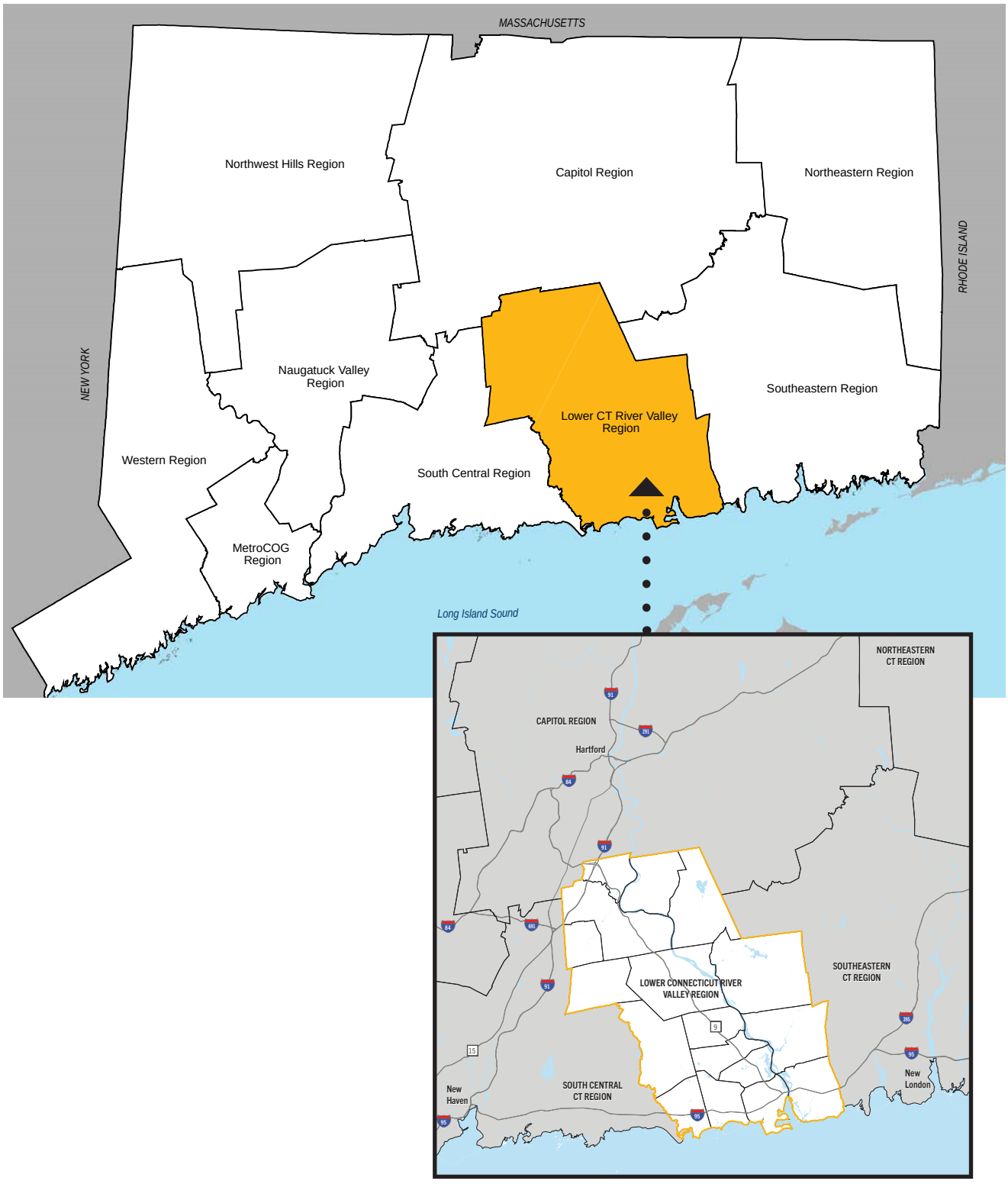
REGIONAL BOUNDARIES

As shown in Figure 1-2, the regional planning area is generally bounded by the Middletown, Middlefield, Durham, Killingworth, and Clinton boundaries to the west, the Cromwell, Portland, and East Hampton boundaries to the north, the East Hampton, East Haddam, Lyme, and Old Lyme boundaries to the east, and the Long Island Sound to the south.

Downtown Businesses in East Hampton

Source:RiverCOG

Figure 1-1. Regional Context



Source: RiverCOG, CT DOT

Figure 1-2. Regional Planning Area

Source: RiverCOG, CT DOT

Lake Beseck in Middlefield

Source:RiverCOG

Local Businesses in Chester

Source:RiverCOG

2. HISTORY

2.1 EARLY HISTORY

For thousands of years, people have lived in what is today known as the Lower Connecticut River Valley (LCRV) region. The area was sparsely inhabited and occupied by numerous Native American tribes including the Mohegan/ Pequot, who lived in settlements along what they called the "long, tidal river" or "quinetucket" – from which both the Connecticut River and, subsequently, the state derived their names.[1] The region's agricultural history began with the gardens planted by indigenous peoples who cultivated such staples as maize, beans, squash, sunflowers, and Jerusalem artichokes.[2]

2.2 COLONIZATION

The region was colonized in around 1623, when the Dutch established a trading post at what is now Saybrook Point in the town of Old Saybrook.[3] Saybrook Point was also the site of the first English military fortification in Connecticut, established in 1635 in the Say-Brooke Colony.[4] Say-Brooke Colony included the present-day towns of Old Saybrook, Westbrook, Clinton, Killingworth, Chester, Deep River, Essex, Lyme and Old Lyme.[5]

Middletown was incorporated as a town in 1650 using the original Wangunk tribe's name for the area - Mattabeseck, before being changed to Middletown in 1653.[6] As Middletown grew, new parishes were founded in areas that would later become Cromwell, Middlefield, and Portland.[7] Between 1660 and 1739, the areas now known as Haddam, East Haddam, Durham, and East Hampton, were settled between the established towns by settlers from other parts of Connecticut and Massachusetts.

Using water as the primary mode of transportation, these early communities were connected to each other by the Connecticut River and Long Island Sound.

2.3 INDUSTRIALIZATION

As the regional population expanded during the 17th and 18th centuries, shipbuilding gained prominence in the lower river valley as well as localized manufacturing made possible by waterpower gained from the region's swiftly flowing streams and rivers.

Middletown grew with its maritime trades, especially shipbuilding, becoming the wealthiest and most populous town in the region.[8] East Hampton developed a thriving brass bell industry along the course of the Pocotopaug river, earning it the nickname "Belltown".[9] In addition, the twine mills along the Moodus River in East Haddam manufactured cotton cord and fish nets that were highly regarded.[10]

Quarrying of building stone also became a significant industry in the region. Stone product included regional specialties such as the red granite schist of Selden Neck and the famous Portland brownstone, which was used in countless buildings in Connecticut and throughout the eastern United States.[11]

During the early 20th century, the region was the leading producer of Witch Hazel and Birch Oil. The E. E. Dickinson Witch Hazel business was headquarted in Essex and had satellite mills throughout many of the region's towns.

2.4 EARLY RAIL TRAVEL

SHORELINE RAILWAY AND CONNECTICUT VALLEY RAILROAD

Water remained the primary mode of transportation in the region until the construction of the Shore Line Railway in 1852 and the Connecticut Valley Railroad in 1871.[12] The Shore Line Railway followed the coast of the Long Island Sound from New York to Boston while the Connecticut Valley Railroad ran through the Connecticut River Valley from Saybrook Point to Hartford.[13] While the Shore Line Railway has seen continuous use and is now part of Amtrak's Northeast Corridor, the Connecticut Valley Railroad fell into disuse until its resurrection as a tourist railroad, the Valley Railroad, in 1971.[14] Today, the Valley Railroad's Essex Steam Train and Riverboat is one the region's most popular tourist attractions.

AIR LINE RAILROAD

The Air Line Railroad ran from New York to Boston from 1873 to 1955.[15] The engineering feats required to achieve this were significant and many cuts, bridges and viaducts were constructed. Most notable of these are the Middletown Swing Bridge and the Rapallo and Lyman Viaducts in East Hampton and neighboring Colchester. Within the region, the Air Line Railroad runs from Durham north to Middletown, across the Connecticut River, then eastward through Portland and East Hampton. A short length of railroad continues to serve industrial customers in Portland.

SHORE LINE ELECTRIC RAILWAY

The Shore Line Electric Railway (SLER) was a trolley line along the southern coastline of Connecticut. Within the LCRV region, the SLER ran along the Route 1 corridor from Clinton to Old Saybrook with a branch line running north to Chester.[16] The SLER was only in operation from 1910 to 1923 and little remains of the line itself beside abutments and overgrown rights-of-way.

AMERICAN IMPRESSIONISM

After the end of the Civil War in 1865, the United States gained unprecedented international political and economic status. American art patrons began traveling abroad and were exposed to European art at unprecedented levels. At that time, French Impressionist were making their debut in Paris. In would take some time, but by the early 1890s, Impressionism was firmly established as a valid style of painting for American artists. The LCRV Region was the center of the Old Lyme Art Colony, the main center of American Impressionism. Today, the Florence Griswold Museum in Old Lyme features 9,500 square feet of exhibit space and nearly 200 pieces in the collection.[17]

Source: RiverCOG

Florence Griswold Museum in Old Lyme,

2.5 AUTOMOBILES & HIGHWAYS

With the advent of the automobile in the post-World War II era, trains gradually lost their importance. Through the following decades, the region's highway systems – including I-95 along the coast, I-91 in Cromwell and Middletown, and the Route 9 expressway, which follows the Connecticut River from Old Saybrook to Cromwell - became the primary transportation routes in the region. While Route 9 unites the region from north to south, I-95 connects the shoreline towns to the east and west.

The iconic early 20th century Arrigoni Bridge, part of Route 66, and the Haddam-East Haddam swing bridge, part of Route 82, also connect the region at its northern and center points over the Connecticut River.

This early 20th century roadway infrastructure created faster connections to urban hubs and facilitated growth of lower density suburban-style housing in the region. The highest growth in the region's history occurred in this era, between 1940 and 1970.

2.6 RENEWED RIVER FOCUS

Industry and development in the 19th and 20th centuries brought growth and prosperity to the region but also resulted in significant contamination of the Connecticut River.

In the 1965 documentary, "The Long Tidal River," narrator (and Old Saybrook resident) Katherine Hepburn describes the river as "the world's most beautifully landscaped cesspool".[18] Connecticut's U.S. Senator Abraham Ribicoff testified before congress that, ""…stretches of this once proud river…. now bear as its official classification: 'Suitable for transportation of industrial wastes without nuisance, and for power, navigation and certain industrial uses'…".[19]

Over several decades, a combination of new organizations - federal, state, and local legislation and programs,and volunteers - have helped to restore the river, bringing back schools of shad and herring, as well as nesting bald eagles in 1989 for the first time in a century.[20]

The cleanup of the Connecticut River increased interest in the region from those attracted to the scenic beauty and the high quality of life provided by the natural landscape. This resulted in the growth of tourism and a recreational marine industry in the region.

GATEWAY COMMISSION

Following a failed federal effort to establish a national park system along the Connecticut River in the late 1960s, a group of local citizens and state legislators lobbied the Connecticut Legislature to establish the "Gateway Conservation Zone" in the lower Connecticut River from Haddam and East Haddam south to Old Lyme and Old Saybrook at the mouth of the river. The Conservation Zone encompasses the hillsides of the Connecticut River in the eight Gateway "member towns" of Chester, Deep River, East Haddam, Essex, Haddam, Lyme, Old Lyme and Old Saybrook. See Figure 9-1.

The Gateway Commission mission is to preserve the lower Connecticut River's unique scenic, ecological, scientific, and historic values, and to prevent deterioration of the "natural and traditional riverway scene" as seen from the river looking up to the first ridge. That preservation mission is primarily carried out through (1) establishing zoning standards that are, in turn, adopted into the zoning regulations of the eight member towns and, (2) through an ongoing program of protecting, either through acquisition of scenic easements or through outright purchase, undeveloped land. The zoning standards are adopted to manage the "visual bulk" of structures as seen from the river. The goal is to fit the building to the river character rather than modifying the hillside for any one particular design.

An important component in the effort to blend development into the hillsides is the retention of the mature tree cover that exists throughout the lower valley. This is accomplished by partnering with the Planning and Zoning Commissions, Zoning Boards of Appeal and the town staff members in each town to ensure the protective mission is carried out as required in the original legislation.

For more information, visit http://ctrivergateway.org/

2.7 THE REGION TODAY

The historic character of the LCRV region is evident in each of its 17 municipalities. From the traditional village, town, and city centers, to the historic network of roads, and from the local playhouses and theaters, to the farmland that has been productive since the 17th century. The region's natural beauty and rich traditions are preserved and celebrated.

However, as the region changes, so do its needs. Many of the 19th and 20th century manufacturing buildings that powered the region's economy have been converted to suit new uses including housing, office space, and new types of manufacturing. The Portland Brownstone Quarry is now a National Historic Landmark and is home to an "Exploration and Discovery Park", featuring a wide array of recreational activities. This report will examine the changes that have occurred in the LCRV region, as well as the trends and challenges it is facing. The data in this report informed the recommendations in the RPOCD.

Portland Brownstone Quarry Discovery Park

ENDNOTES

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3. DEMOGRAPHICS

3.1 POPULATION CHANGES

The LCRV region experienced steady population growth beginning in the 1900s. As shown in Figure 3, this growth was punctuated by two significant boom periods. The first of these periods occurred between 1920 and 1930, with a population increase of 31%; the second occurred between 1950 and 1970, with a population increase of 55%. The region saw its first decline in population in 2010 and has continued a downward trend since that time. As of 2018, the region had an estimated population of 173,268.[1]

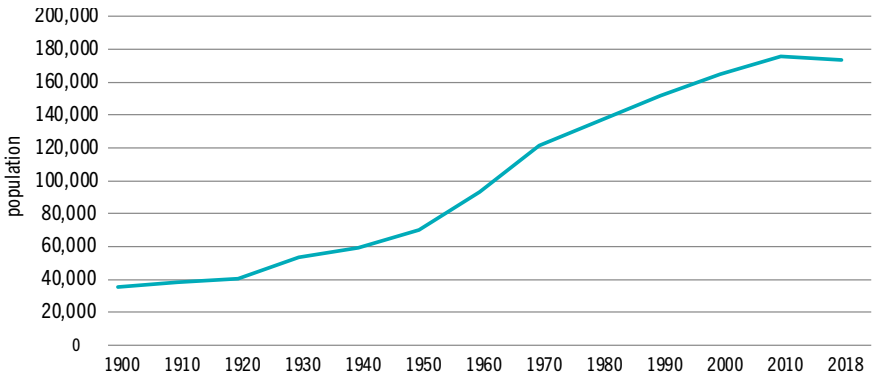


Figure 3-1. Regional Population Change 1900 - 2018

US Census Bureau
Decennial Census
**American Community Survey*
(5 -year estimates)

Regional Growth Breakdown

Population growth has not been equally distributed over the region's 17 municipalities. The period in which a municipality experiences its most significant growth can influence its character, architectural style, and pattern of development. Figure 3-2 provides a visual representation of the differing growth patterns across the region, which can be summarized as follows:

- The city of Middletown's population grew by 80% during the 1920s, which accounts for almost all of the region's 1920s boom. Middletown continued to grow steadily at around a 10% rate through the end of the century.
- The towns of Portland, Old Saybrook, Clinton, and Middlefield saw substantial population growth in the post-WWII era, and then only a modest increase over the following decades.
- The towns of East Haddam, Essex, Westbrook, Durham, Old Lyme, Haddam, Cromwell, East Hampton, and Killingworth experienced steady population growth beginning in the 1940s and continuing into the end of the century. Cromwell and East Haddam experienced substantially more robust population growth, resulting in larger overall populations. The towns of Deep River, Lyme, and Chester have all maintained relatively low populations and experienced only moderate growth in any decade.

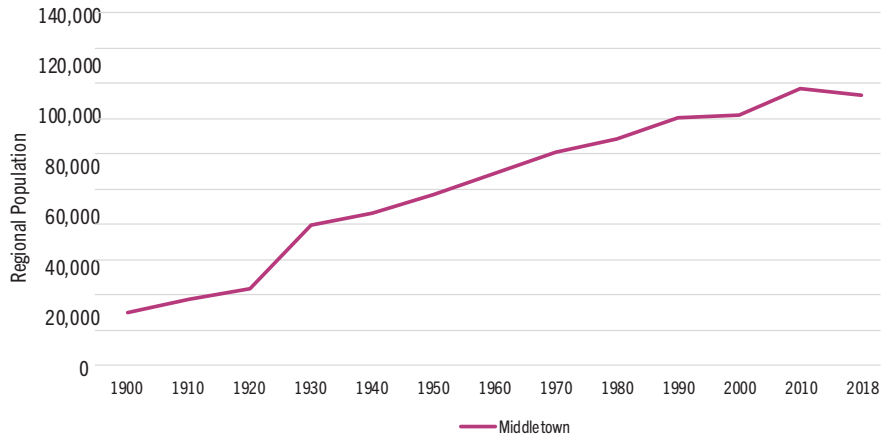
Figure 3-3 illustrates the current population density across the region. Areas around Middletown and Cromwell are the more densely populated areas, with moderate population density in the coastal towns, as well as Essex and Deep River.

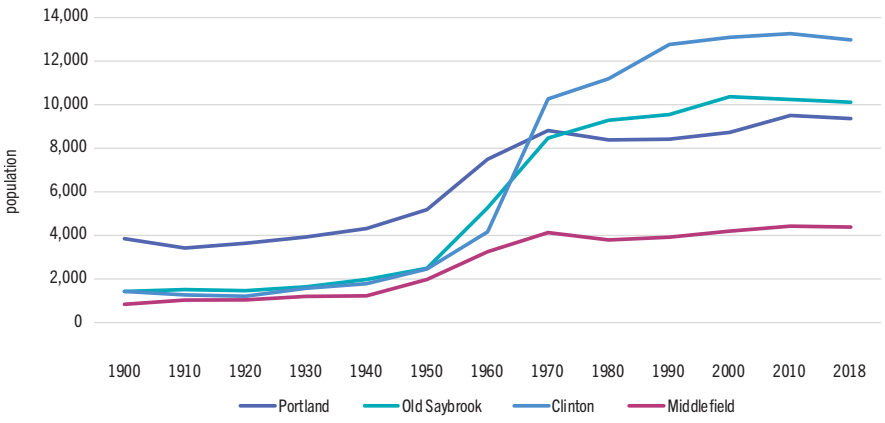
RECENT DECLINES

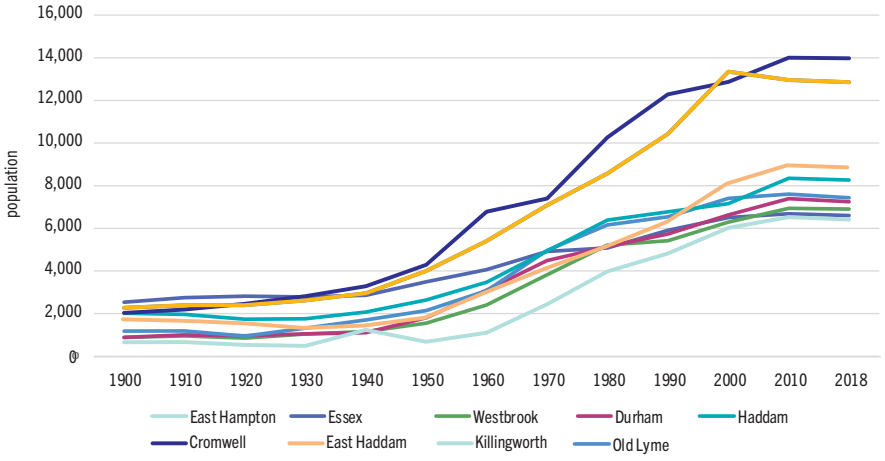
Between 2010 and 2018, the region's population declined by 0.9%.[2] For comparison, over the same period, the State of Connecticut experienced 0.6% population growth and the United States as a whole saw 4% population growth.[3] Natural population change, defined as the difference between the total number of resident deaths and the total number of resident births, can explain a portion of this decline. As shown in Figure 3-4, the total number of births in the region declined by 28% since 2010, while the total number of deaths in the region rose by 8% over the same period.[4] As a result, the region lost 237 more residents to death than it added through births, resulting in a natural population loss. Migration patterns have also contributed to the region's population decline. The U.S. Census publishes American Community Survey migration data at the county level. According to this data, Middlesex County, which includes all municipalities in the region except Lyme and Old Lyme, lost a net 2,994 people as a result of migration between 2010 and 2018.[5] This information is shown in Table 3-1.

In total, 4,313 people left Middlesex County for other places in the country. However, this loss was mitigated by an increase of 2,379 people who migrated into the County from abroad.[6] Interestingly, as shown in Table 3-2, the proportion of foreign migrants residing in Middlesex County remained unchanged over this same period, suggesting that the region is not retaining the foreign migrants that it attracts.

The majority of domestic migration into Middlesex County is from neighboring counties in Connecticut (71%), with only 9% from the rest of the Northeast.[7] Similarly, top destinations for migrants leaving the region were other counties in Connecticut (59%), Florida (3%), Massachusetts (2%) and New York (1.5%).[8]







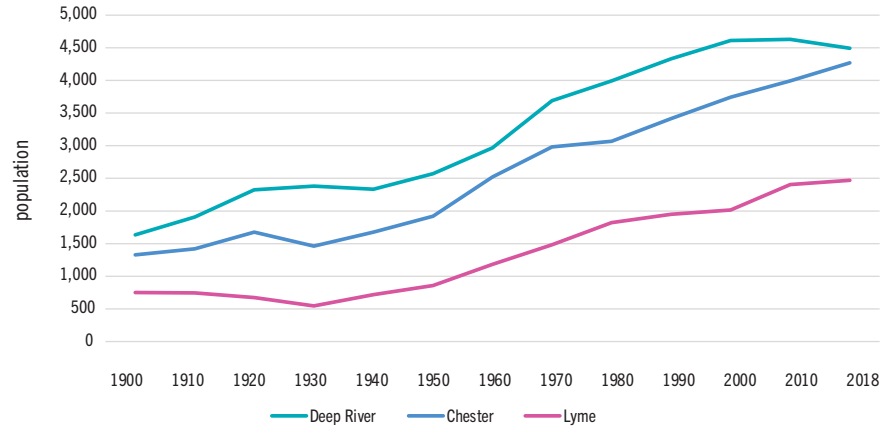
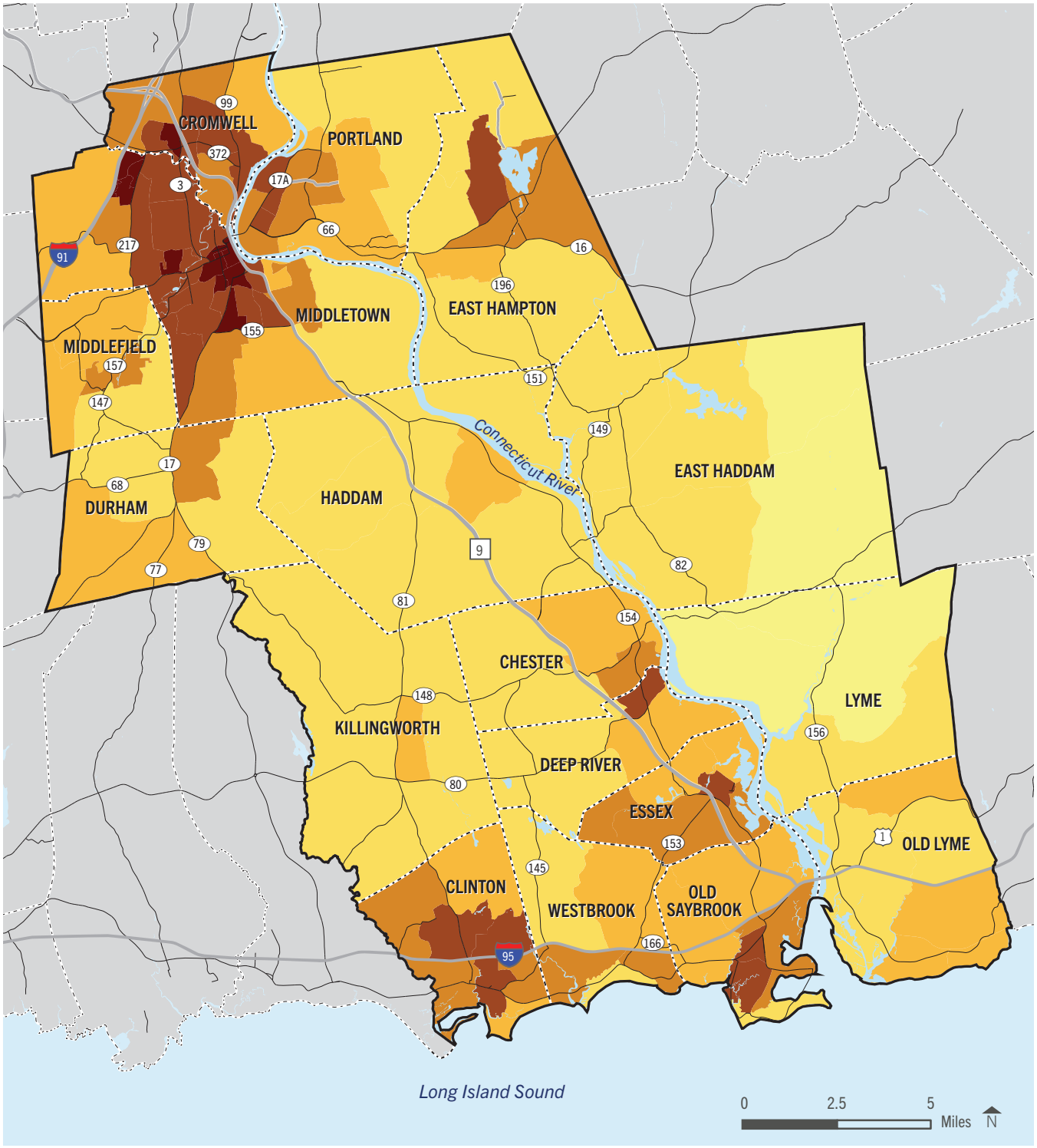


Figure 3-2. Regional Growth

US Census Bureau
Decennial Census
**American Community Survey*
(2014 - 2018 5 -year estimates)

Figure 3-3. Population Density



Population Density Per Square Mile

- Under 100 Persons
- 100 - 250 Persons
- 251 - 500 Persons
- 501 - 1,000 Persons
- 1,001 - 3,000 Persons
- 3,000 Persons and Over

Source: U.S. Census Bureau, American Community Survey 2019 5- Year Estimates

POPULATION PROJECTIONS

Population projections are estimates of future population based on current population trends, assuming no changes to current trends occur. In 2017, the Connecticut Data Center at the University of Connecticut released their 2015 to 2040 population projections, based on birth and mortality data from the Connecticut Department of Public Health, migration data derived from U.S. Census Bureau Decennial Census, and birth and death data from the Connecticut Department of Public Health.[9] As shown in Table 3-3, the Connecticut Data Center model predicted a 2.6% population decrease for the LCRVR from 2015 to 2040.

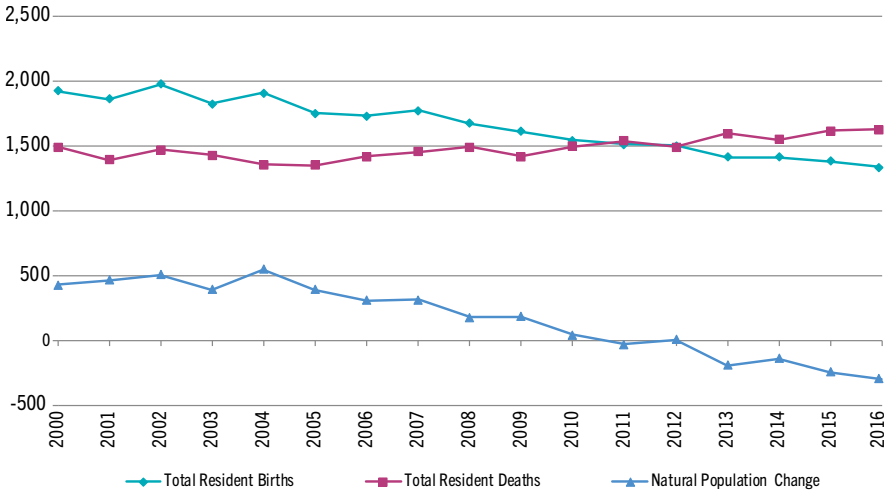


Figure 3-4. Natural Population Change 2000 - 2016

Connecticut Department of Public Health

It should be noted that individuals who reside in another state but either own property or work remotely in a town within the state of Connecticut are not included in these population projections. As such, this data likely does not include seasonal residents.

Table 3-1. Migration 2010 - 2018

Migration Change	Natural	Migration	
		International	Domestic
-2,994	-978	2,379	-4,313

U.S. Census Bureau; Estimates of the Components of Resident Population Change: April 1, 2010 to July 1, 2018

Table 3-2. Foreign Population Change 2010 - 2018

		Foreign Born	
Native	Total	Count	Proportion
2018	**163,368**	12,495	7.6%
2010	**164,774**	12,777	7.8%

Source: U.S. Census Bureau, American Community Survey 2006-2010; 2014-2018

3.2 AGE

Between 2000 and 2017, the region's median age increased by 18%. This is compared to a 13% increase in Connecticut and a 7% increase in the United States.[10] In 2018, the region had a median age of 45.6 years old. As shown in Figure 3-5, this is 3.2 years higher than the median age in Connecticut (42.4) and 7.8 years higher than the median age in the Unites States. (37.8).

The median age for each municipality is provided in Table 3-4. The difference between the highest median age (54.7 in Lyme) and the lowest median age (36.6 in Middletown) is eighteen-years, and fifteen of the municipalities have a median age of over 45. Middletown, with its large population and low median age, significantly lowers the median age of the region.

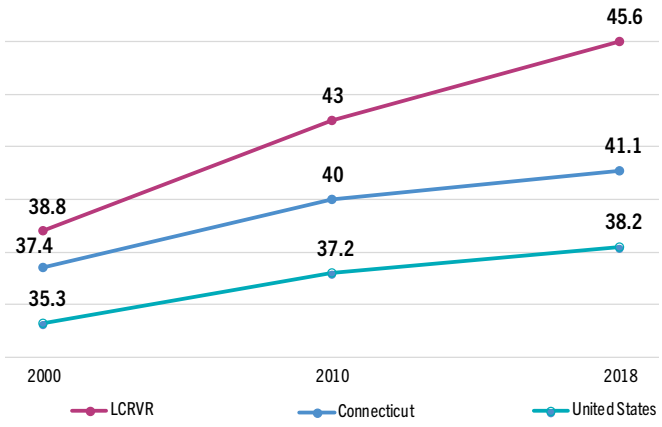
The region has a sizeable baby boomer population (1946-1964) and few millennials (1981-1996).[11] A breakdown of the regional population by age range is shown in Figure 3-6. The age gap is expected to increase according to the Metropolitan Transportation Plan: the LCRV region is home to an estimated 33,786 individuals over 65 years of age and this population is expected to increase by more than 8,000 individuals by 2040.[12]

3.3 RACIAL AND ETHNIC DIVERSITY

RACE AND ETHNICITY

The vast majority of the region's residents (89%) identified as being White alone, while 5% identified as Black alone, and 3% identified as Asian.[13] The 3% remaining identified as another race (American Indian/Alaskan or Native Hawaiian/Pacific Islander) or as more than one race.[14] The region has a higher proportion of residents identifying as

Figure 3-5. Median Age 2000 - 2018



US Census Bureau, American Community Survey 2014-2018

Table 3-3. Population Projection 2040

Location	2015	2040	Change	
Chester	3,982	3,313	-669	-16.8%
Clinton	12,784	9,484	-3,300	-25.8%
Cromwell	14,365	16,160	1,795	12.5%
Deep River	4,458	3,201	-1,257	-28.2%
Durham	7,509	6,791	-718	-9.6%
East Haddam	9,233	8,165	-1,068	-11.6%
East Hampton	13,403	11,543	-1,860	-13.9%
Essex	6,505	5,082	-1,423	-21.9%
Haddam	8,681	8,630	-51	-0.6%
Killingworth	6,522	4,955	-1,567	-24.0%
Lyme	2,499	2,742	243	9.7%
Middlefield	4,446	4,333	-113	-2.5%
Middletown	48,319	57,666	9,347	19.3%
Old Lyme	7,437	6,040	-1,397	-18.8%
Old Saybrook	9,789	6,987	-2,802	-28.6%
Portland	9,695	10,145	450	4.6%
Wesbrook	7,048	6,911	-137	-1.9%
Total	**176,675**	**172,148**	**-4,527**	**--**

CT State Data Center, 2017

Table 3-4. Median Age by Municipality

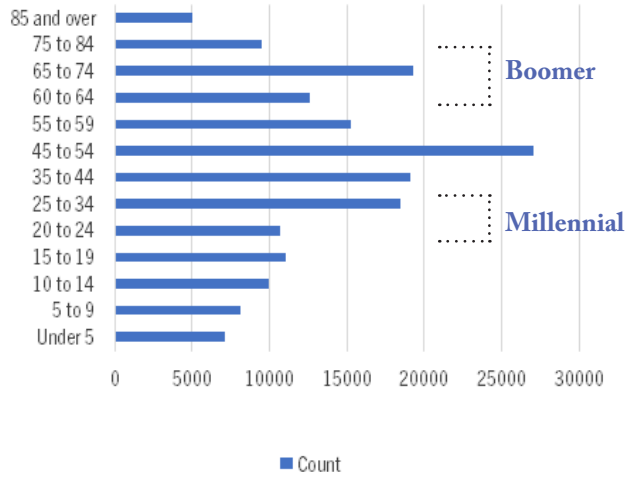
	Median age
Essex	54.7
Lyme	52.9
Westbrook	52.7
Old Saybrook	52.2
Old Lyme	51.7
East Haddam	49.3
Middlefield	49.2
Haddam	49.1
Chester	48.9
Killingworth	47.9
Durham	46.6
Clinton	46.2
Portland	46.2
Deep River	46.0
East Hampton	45.6
Cromwell	42.5
Middletown	36.6

US Census Bureau, American Community Survey 2014-2018

White than the state of Connecticut (77%) and the United States as a whole (73%).[15]

Based on 2019 data, Middletown is the most diverse municipality in the region and is home to its largest percentage of Black (15%), Asian (6%), and bi- and multi-racial (8%) populations.[16] Conversely, the least diverse municipalities are Durham (98% white), Portland (97% white), Middlefield (97% white) and Chester (97% white).[17]

Figure 3-6. Population by Age Range



US Census Bureau, American Community Survey 2014-2018

In ten of the region's municipalities, the white population accounts for 95% or more of the total population.[18]

Over the coming decades, these regional demographics are likely to change. Only 60% of residents under the age of 30 identified as White alone, making the region's younger residents substantially more racially diverse that the overall population. Whether this level of diversity continues into future decades depends on how many of these young people remain and raise families in the region and how many new young people move to the region from other parts of the United States or abroad.

In addition to shifts in racial composition, the region is also becoming more ethnically diverse. In 2018, 5.9% of the region's total population identified as Hispanic. This represents a substantial increase from 2.9% in 2000 and 4.6% in 2010.[19] 5% identified as Black or African American and 3% identified as Asian. These percentages have also increased since 2000 and 2010.

FOREIGN BORN

As noted above, Middlesex County lost a total of 4,313 residents to out migration. This number was substantially offset by the 2,379 people who moved into the County from abroad, meaning that the region has become home to a substantial number of foreign migrants. Table 3-5 provides summary details of the 12,495 (7.6%) foreign born residents in the Middlesex County who are predominately from Europe (38%), Asia (29%) and Latin America (23%).[20] Those from Europe are only slightly more likely to be naturalized U.S. Citizens.

Residents born outside of the U.S. are demographically similar to the general population of the region. The most notable difference between the native born and foreign-born populations is that there are proportionately more foreign-born residents with less than a high-school diploma, and there are also proportionately more foreign-born residents who have graduate or professional degrees.[21] This suggests that there are two subsets of foreign-born residents: one group who is less educated and who presumably works in lower skilled jobs and one more highly educated working in the high-skilled jobs in the region.

3.4 INCOME

MEDIAN HOUSEHOLD INCOME

The US Census publishes median household income (MHI) data at the County level as well as by town. In 2018 the MHI for Middlesex County was $84,761 (in 2018 dollars), which was significantly higher than the state of Connecticut's MHI ($76,106).[22] The only region with a higher median income was Fairfield County ($91,079). Table 3-6 provides a breakdown of MHI by municipality.

Incomes throughout the region are not evenly distributed. As of 2018, Middletown had the lowest MHI at $67,651, while Durham, East Hampton, Haddam, and Killingworth all had an MHI of over $100,000. This disparity is more distinguished when considering actual household income. Figure 3-7 shows actual household income for households across the region. While 13,872 households in the region earn between $100,000 and $149,999 annually, 20,719 households earn less than $50,000.[23]

Table 3-5. Country of Origin of Foreign Born

Europe	4,760	38.1%
Asia	3,682	29.5%
Africa	534	4.3%
Oceania	16	0.1%
Latin America	2,925	23.4%
Northern America	578	4.6%
Total	12,495	100.0%

US Census Bureau, American Community Survey 2014-2018

POVERTY

The Federal Poverty Level for 2017 for the lower 48 states was $12,228 for single-person households and $24,563 for a household of four.[24] According to this standard, 7% of the region's total population, or 4% of its households are living in poverty. Based on this standard, the region's poverty rate is lower than both the state of Connecticut (10%) and the United States as a whole (15%).[25] However, this rate represents a 17% increase in the number of residents living in poverty in the region since 2010.

Certain groups of residents in the region are disproportionately impacted by poverty. Specifically, 9.2% of female-headed households with no husband present live below the poverty line, as do 14% of Black households and 13% of Hispanic or Latino households. Only 4% of White households in the region are living in poverty.[26]

Children are also disproportionately impacted, as 40% of the region's residents living in poverty were under the age of eighteen. According to the Connecticut State Department of Education, 5,715 out of 21,011 (27%) of the region's students qualified for the free or reduced-price lunch program in the 2018 - 2019 school year.

CONSTRAINED INCOME

Due to the relatively high cost of living in the region, the Federal Poverty Level is an inadequate measure of residents' ability to meet their basic needs. An alternative measurement is the "Asset Limited, Income Constrained, Employed" (ALICE) standard, which was developed by the United Way. The ALICE standard takes into account the local cost-of-living and calculates the amount of income a household would need in order to afford a "very modest standard of living."[27]

The ALICE standard is calculated at the county level. For Middlesex County, which does not include Lyme or Old Lyme, a single adult in 2016 would need to earn $24,444 to meet their basic needs, while a family of four would need $79,212. This represents a wage of $12.22 per hour for single adult and a combined hourly income of $39.61 for a family of four.[28]

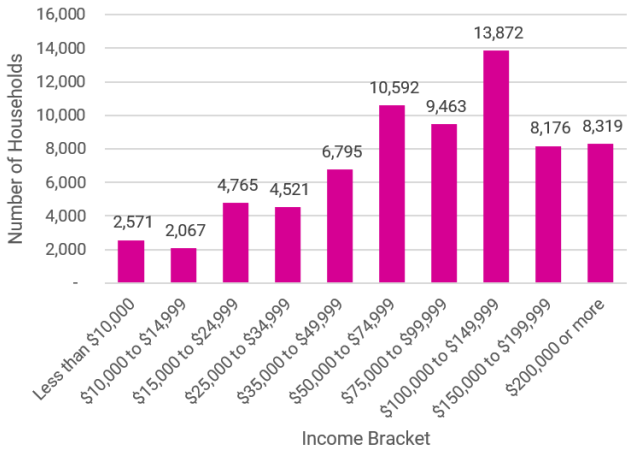
In 2016, 28% of the region's households were Asset Limited, Income Constrained, Employed. This percentage has been consistent since 2012. Table 3-7provides a comparison of households living below the Federal Poverty Level and those falling below the ALICE threshold by municipality.

Table 3-6. Median Household Income

	Median Income
Durham	$117,631
Killingworth	$113,068
Haddam	$108,800
East Hampton	$100,780
Lyme	$96,146
Middlefield	$93,750
Chester	$92,417
Old Lyme	$92,383
Cromwell	$91,841
East Haddam	$91,339
Portland	$91,295
Westbrook	$89,489
Essex	$87,000
Old Saybrook	$81,411
Clinton	$76,360
Deep River	$71,641
Middletown	$67,651

US Census Bureau, American Community Survey 2014-2018

Figure 3-7. Household Income



US Census Bureau, American Community Survey 2014-2018

Table 3-7. Poverty and ALICE Households by Municipality

Location	Households	Poverty Household	Children Under 18 in Poverty	Households in Poverty	ALICE Households	ALICE Households
Chester	1,853	64	3.6%	3.5%	512	27.6%
Clinton	5,294	514	10.4%	9.7%	1,310	24.7%
Cromwell	5,631	238	5.8%	4.2%	1,233	21.9%
Deep River	1,902	95	5.7%	5.0%	611	32.1%
Durham	2,650	83	0.0%	3.1%	347	13.1%
East Haddam	3,541	195	2.9%	5.5%	793	22.4%
East Hampton	4,951	314	6.8%	6.3%	928	18.7%
Essex	2,961	185	5.5%	6.2%	559	18.9%
Haddam	3,223	182	3.3%	5.6%	402	12.5%
Killingworth	2,479	53	3.0%	2.1%	369	14.9%
Lyme	1,066	23	0.0%	2.2%	319	29.9%
Middlefield	1,775	76	12.0%	4.3%	370	20.8%
Middletown	19,219	2,119	15.8%	11.0%	6,384	33.2%
Old Lyme	3,191	82	2.4%	2.6%	780	24.4%
Old Saybrook	4,201	230	3.6%	5.5%	1,262	30.0%
Portland	3,948	173	9.1%	4.4%	989	25.1%
Westbrook	2,839	172	0.9%	6.1%	765	26.9%

United Way of Connecticut

MEASURE OF STABILITY

The ALICE standard does not account for expenses such as education costs, retirement savings, emergency funds, or other discretionary budget items that impact upward mobility and resiliency. To capture these expenses, the United Way developed the ALICE Household Stability Budget. Based on this standard, a single adult in Middlesex County would need to earn over $36,816 annually, while a family of four would need $114,192.[29] Using this standard, a majority of the region's household would fall below this Stability standard.

3.5 HOUSEHOLD COMPOSITION AND SIZE

The composition and size of the region's households has shifted in recent years. In 2017, married couple families accounted for 52% of all households in the region. This was slightly higher than the state of Connecticut at 49%. With the exception of Cromwell, Middletown, and Westbrook, a majority of households in each of the region's municipalities were comprised of married-couple families.

Notwithstanding, the number of non-family households in the region are growing. As defined by the US Census Bureau, a non-family household is an individual living alone or sharing a home exclusively with people to whom he or she is not related. In 2017, 35.7% of households in the region were non-family households; this represents an increase of 14.3% from 2000.

As of 2019, there were an estimated 9,002 households in the region comprised of an individual over the age of 65 and living alone. This accounts for an estimated 13% of all households in the region. Municipalities with the largest elderly populations also have the highest percentage of seniors living alone.[30] These include Chester (18%), Essex (16%) and Old Saybrook (16%). It is important to note that these municipalities contain sizable nursing homes and assisted living facilities for seniors.[31]

As a result of the increase in single-person households, combined with declining birthrates, the average household size in the region is now 2.37 persons per household, down from 2.46 in 2010.[32]

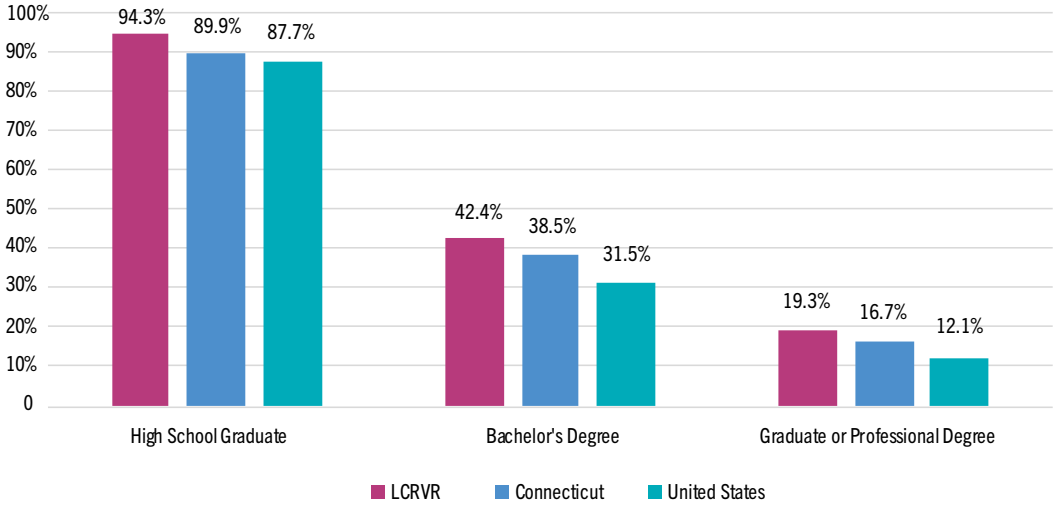
3.6 EDUCATION LEVELS

As shown in Figure 3-8, the region has a higher level of educational attainment than the state of Connecticut and the United States as a whole. As of 2017, 94% of residents had a high school diploma or equivalent, 42% had at least a bachelor's degree, and 19% had a graduate degree or higher.[33] Educational attainment was largely consistent across different racial and ethnic groups. The high school graduation rate in the region was at least 90%, regardless of race or ethnicity.[34] Notably, however, Black residents had a significantly lower percentage (25%) holding a bachelor's degree or higher. This was still 4% higher than the national or statewide percentage.[35]

3.7 LANGUAGE

English is the primary language in the region. At home, 89.7% of residents over the age of five speak English. Other languages are also spoken - 7,806 (4.7%) speak "Other Indo-European Languages", 6,341 (3.8%) speak Spanish, 2,329 (1.4%) speak Asian and Pacific Island Languages, and 711 (0.4%) speak other languages.[36] The majority of the adults (aged eighteen years or older) in these categories speak English "very well" according to the American Community Survey. The percentages range by group and municipality, but overall 63% of adults who speak Spanish at home speak English "very well", as do 70% of Other Indo-European Languages speakers, 57% of Asian and Pacific Island Languages speakers, and 58% of speakers of "other languages.

Figure 3-8. Median Education Level 2018



US Census Bureau, American Community Survey 2014-2018

Wesleyan University Campus, Middletown

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4. LAND USE

4.1 INTRODUCTION

The Lower Connecticut River Valley region encompasses approximately 440 square miles, or 283,000 acres, of land. Based on satellite imagery approximately 15% of the region's land area is "developed." The region is predominately rural in character, covered by forest, grass, and water, with single family homes sited on multiple acres. There are exceptions, however, and the character of each town is unique. Middletown, as well as the historic town centers near the Connecticut River and the shoreline towns, tend to have more dense development, while towns further removed from the river tend to be more rural or agrarian. This section will provide a breakdown of existing land uses and municipal zoning for future land use in the region, including a brief description and the amount of land dedicated to each.

4.2 OVERVIEW OF EXISTING LAND USES

Existing land uses were identified from town data and aerial photography. The analysis used parcel-level information from the Geographic Information Systems (GIS) databases and local Tax Assessor's data. The parcel delineation was produced from the 2013 RiverCOG Seamless Parcel Layer, which homogenized the existing parcel information from the region's towns using a Class D town boundary survey. The combined data describes the breakdown of existing built land uses in the region.

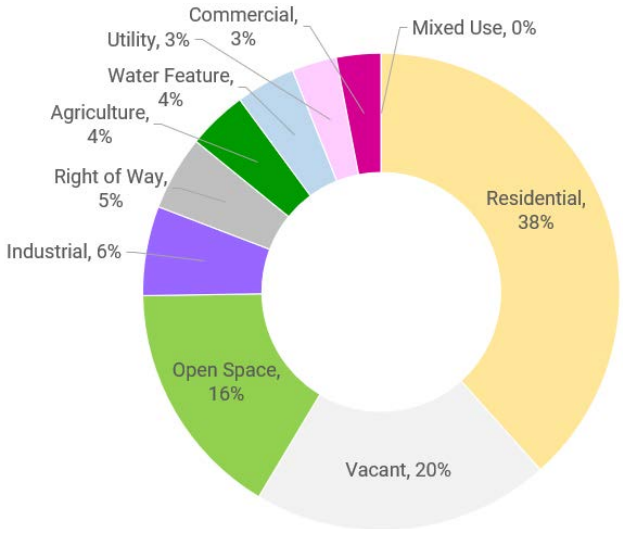
Table 4-1 shows the breakdown of existing land uses in acres and percentage of land. Figure 4-1 shows the percentage of each existing land use in a pie chart. Figure 4-2 shows the overall pattern of existing land use in the region.

Table 4-1. Regional Land Uses

Land Use	Acreage	Percentage
Residential	106,950	37.7
Commercial	8,838	3.1
Industrial	4,028	1.4
Institutional[1]	18,329	6.5
Mixed Use	1,10	0.1
Agriculture	11,119	3.9
Open Space	44,842	15.8
Water Feature	11,798	4.2
Vacant [2]	56,884	20.0
Right of Way	14,027	4.9
Utility	7,083	2.5

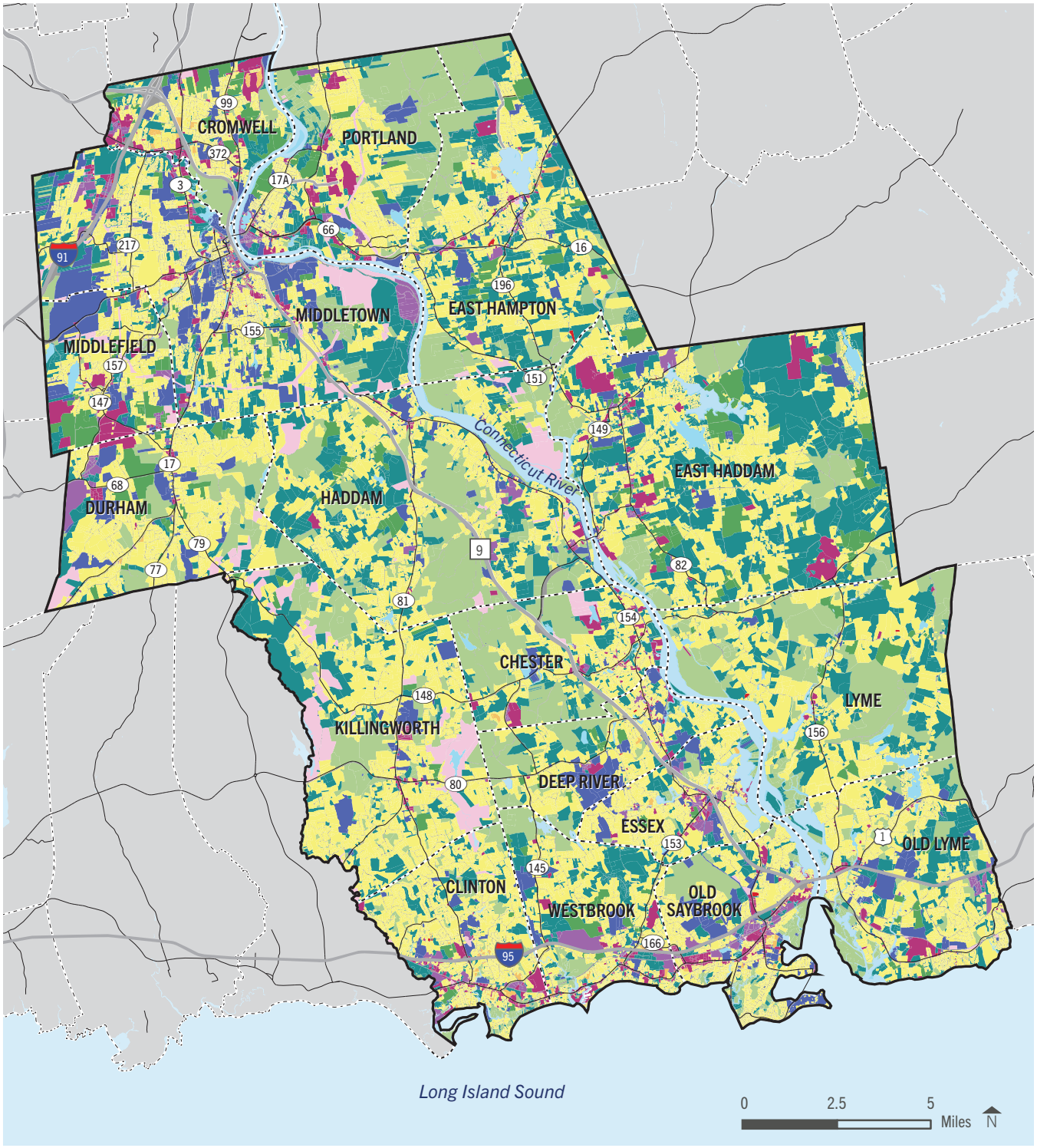
1. Defined as any parcel that is owned by a government, university or nonprofit organization that is not an open space parcel.
2. Defined as any parcel that is owned privately and is not currently developed or utilized.

Figure 4-1. Regional Land Uses in Percentage of Acres



RiverCOG Seamless Parcel Layer, 2013

Figure 4-2. 2013 Regional Land Uses



Land Use Category

- Residential
- Residential Condo
- Commercial
- Industrial
- Institutional
- Mixed Use
- Agriculture
- Open Space
- Right of Way
- Utility
- Vacant Land
- Water Feature

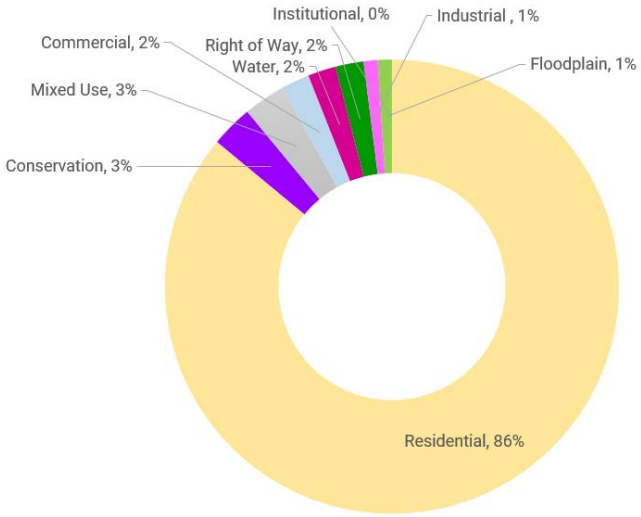
Source: RiverCOG Seamless Parcel Layer, 2013

4.3 OVERVIEW OF ZONING

In contrast to existing land use, which classifies the current built environment, zoning identifies what can be built under current municipal regulations. Municipal zoning regulations may be, but are not always, consistent with existing land uses.

Zoning data from each of the region's municipalities was compiled by RiverCOG and grouped into generally equivalent categories, allowing the zoning data to be compared across the region. Table 4-2 shows the breakdown of zoning in acres and percentage of land. Figure 4-3 shows each zoning category as a percentage of land in a pie chart. Figure 4-4 shows the overall zoning pattern for the region.

Figure 4-3. Zoning in Percentage of Acres



RiverCOG Seamless Parcel Layer, 2013

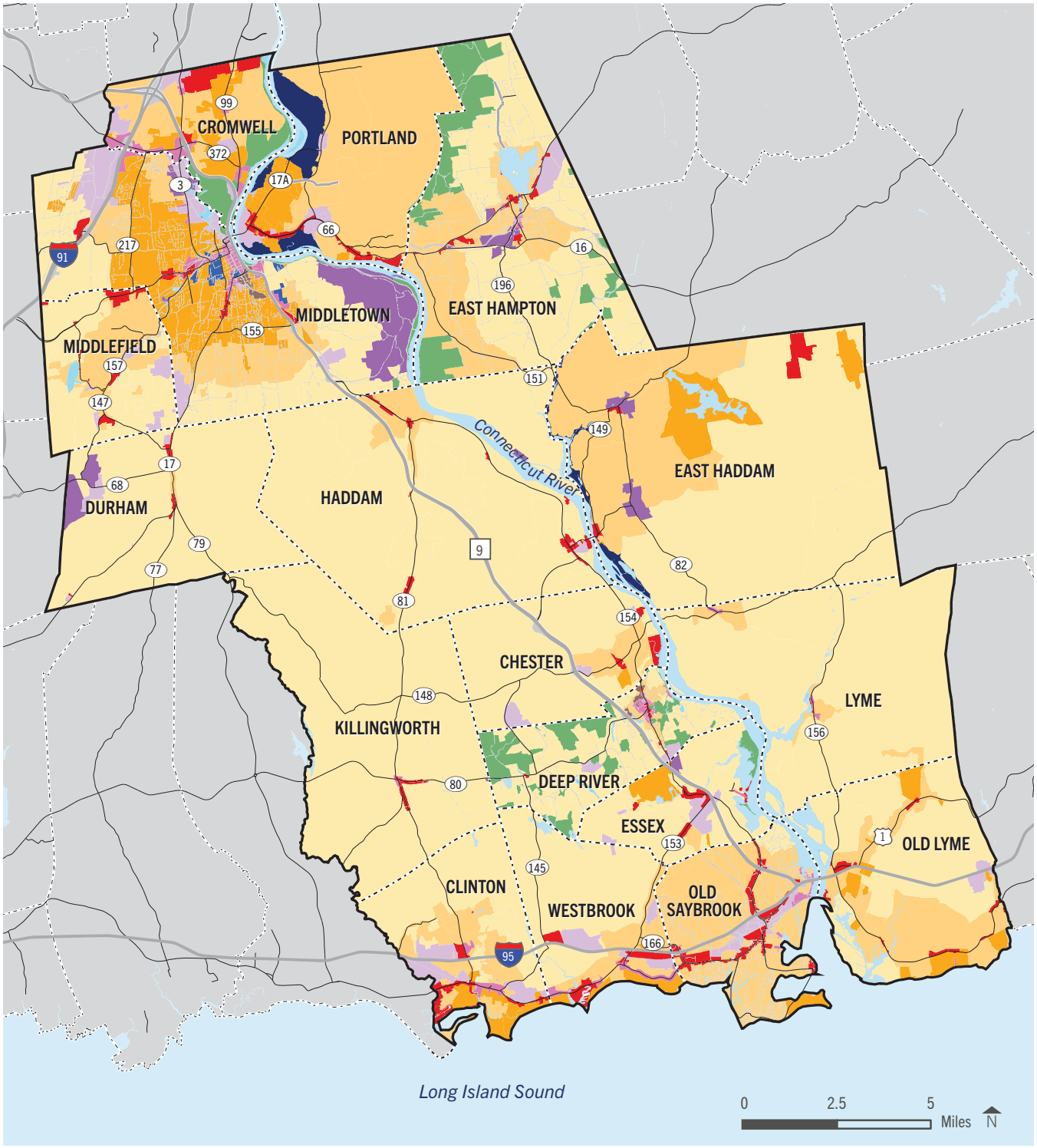
Table 4-2. Regional Zoning District Area

Zone	Acreage	Percentage
Residential	243,515	85.7
Low Density Residential*	171,480	60.4
Medium Density Residential	56,684.	19.9
High Density Residential	15,351	5.4
Commercial	4,883	1.7
Industrial	3,9697	1.4
Mixed Use	8,907	3.1
Mixed Use Commercial/ Residential	6,961	2.5
Mixed Use Commercial/ Industrial	1,783	0.6
Mixed Use Urban (Legacy Transitional Zone, Commercial, Residential, Industrial)	163	0.06
Institutional	295	.1
Conservation	7,328	2.6
Floodplain	2,590	0.9
Water	7,136	2.5
Right of Way	5,458	1.9

RiverCOG Seamless Parcel Layer, 2013

*Includes rural/agricultural zones that allow low density single family residential

Figure 4-4. Consolidated Zoning



Zoning Category

- Low Denisty Residential - (Less than 1 dwelling unit per acre)
- Medium Denisty Residential (1-2 dwelling units per acre)
- High Denisty Residential (Over than 2 dwelling units per acre)
- Commercial
- Mix Use, Commercial and Industrial
- Mix Use, Residential and Commercial
- Mixed Use; Residential, Commercial, Industrial
- Industrial
- Institutional
- Conservation*
- Flood Plain

*Conservation does not include conservation easements

Source: RiverCOG Seamless Parcel Layer, 2013

4.4 EXISTING LAND USE AND ZONING PATTERNS

RESIDENTIAL

A residential land use designation is given to any parcel of land that primarily contains residential units, including assisted living facilities. As can be seen in Table 4-1 and Figure 4-1, residential land use is the most prominent in the region, accounting for 106,950 acres, or 38% of overall land. Similarly, residential zones predominate the region – approximately 243,515 acres, or 86% of the region, is zoned residential. While there is a large gap between the amount of residential land use and land zoned residential, this may be attributable to the lack of open space zones in the region; low density, single-family residential zoning is generally considered consistent with the open space land use designation. In fact, of the land designated open space, 29,820 acres (67%) is zoned low density residential and 7,636 acres (17%) is zoned medium density residential.

In residential zones, density is expressed as the number of housing units allowed to be built per acre of land (dwelling units/acre, or du/ac). As shown in Table 4-2, approximately 17,1480 acres or 60% of the region is zoned low density residential (< 1 du/ac). This is compared to 56,684 acres or 20% medium density residential (1-2 du/ac) and 15,351 or 5% high density residential (>2 du/ac). As can be seen in Figure 4-4, the medium density and high density residential zones are concentrated in the northern part of the region (Middletown, Cromwell, and Portland) and the shoreline towns (Clinton, Westbrook, Old Saybrook, and Old Lyme), with clusters in East Haddam and near village centers along the Connecticut River. The predominant residential density in the region is less than one dwelling unit per acre, demonstrating the relatively sparce development pattern in the region.

Historic Main Street, Essex

Source: FHI

Despite the amount of land dedicated to residential development, housing growth in the region has declined sharply since the Great Recession of 2008. Only around 2,070 new building permits for housing units were issues in the region from 2010 to 2019; an equivalent of roughly 207 permits per year.[3] Municipalities that saw the largest number of permits issued were those with highest residential density: Middletown (388 permits), Cromwell (221 permits), and Old Saybrook (215 new permits).[4] Those municipalities with the lowest number of permits were Killingworth (19 permits), Deep River (24 permits), and Lyme (28 permits).[5] However, incomplete data exists for Chester, Killingworth, and Old Lyme. A further discussion of regional housing stock can be found in the Housing section of this report.

COMMERCIAL

A commercial land use designation is applied to any parcel containing primarily a commercial business. As can be seen in Table 4-1 and Figure 4-1, commercial land use accounts for only 8,838 acres or 3% of the region. Similarly, commercial zones account for 4,883 acres or 2% of the region. While there is a slightly less land zoned for commercial than the land use designation would suggest, this could be the result of existing non-conformities or special exemptions that permit commercial uses outside of the commercial zones.

As can be seen in Figure 4-2 and Figure 4-4, there are no large concentrations of commercial use in the region. Instead, the region is characterized by small commercial centers, scattered throughout. These commercial centers can be categorized as historic village centers, neighborhood commercial centers, and regional commercial centers.

Historic Village Centers

Historic village centers are located in many of the region's municipalities and contribute greatly to the region's character. Some of the most notable are located in Chester, Deep River, Essex, Old Lyme, and Old Saybrook. Historic village centers are typically oriented toward pedestrian access and characterized by clustered shops fronting the sidewalks and parking located on the street or behind the buildings. Goods and services such as grocery stores, retail shops, banks, and restaurants are common in these centers.

Neighborhood Commercial Centers

Neighborhood commercial centers are larger in scale and typically draw visitors from neighboring towns. Located predominately in Middletown, Cromwell, and Old Saybrook, these neighborhood centers include a mix of small independent businesses and larger chain retailers. Neighborhood commercial centers are typically oriented toward vehicular access and characterized by large shopping plazas with multiple stores surrounding a large central parking lot.

Regional Commercial Centers

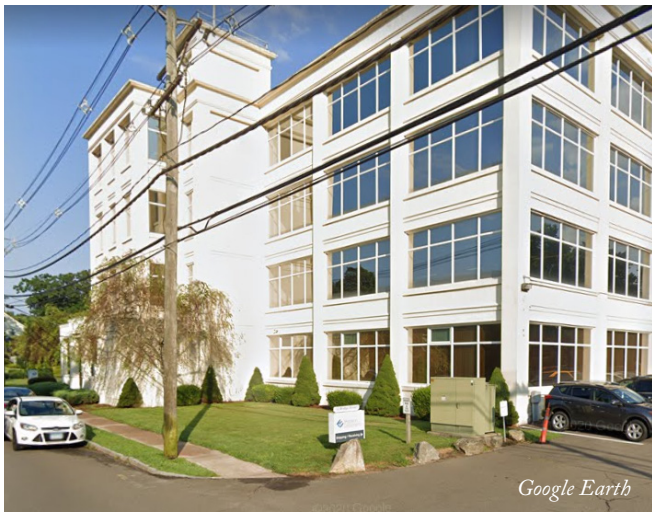
Regional commercial centers are shopping destinations that draw visitors from within the state as well as from neighboring states. In the late 1990's and early 2000's the region saw the development of two major regional commercial centers: the Clinton Crossing Outlets in Clinton, and the Tanger Outlets (now known as the Westbrook Outlets) in Westbrook. These regional commercial centers contain a variety of chain retail stores and are characterized by clusters of shops connected by paseos and surrounded by a large parking lot.

INDUSTRIAL

The industrial land use designation is applied to any parcel containing primarily industrial business, which can range from manufacturing of goods to mining operations. As can be seen in Table 4-1 and Figure 4-1, Industrial land use accounts 4,028 acres or 1% of the region. Similarly, industrially zoned land accounts for at 3,969 acres or 1% of the region. However, the location of industrial land use (shown inFigure 4-2) does not align with the location of industrial zones (shown in Figure 4-4). While industrial land use is scattered throughout the region, but predominately in Portland, Middlefield, Haddam, Westbrook, and Old Saybrook, industrial zones are concentrated in Middletown, Durham, East Haddam, and East Hampton. Some of this discrepancy can be explained by the overlap in industrial zoning categories with the industrial land use. Much of the land designated industrial, particularly along the shoreline, is zoned "mixed use commercial industrial". In addition, industrial zoning is sometimes used to rehabilitate underutilized sites. For example, a portion of the industrially zoned land in Middletown was designated vacant, transit, or non-profit.

Today the region is characterized primarily by light industrial manufacturing operations. As discussed in the History section, manufacturing has been a mainstay of the region's economy. However, the scope, scale and location of manufacturing today has shifted from shipbuilding, bells, and fishing nets to aerospace, chemical, electronic, and metal or plastic goods. Industrial plants in the region are generally located on areas of flat, developable land and are characterized by large, single-story, steel-framed, prefabricated structures with minimal architectural embellishment.

Silgan Plastics Company, Deep River



AGRICULTURAL

The agriculture land use designation is applied to any parcel that contains an agricultural use. This includes all types of agriculture - from large scale nurseries to small residential farms. As can be seen in Table 4-1 and Figure 4-1, agricultural land use accounts for approximately 11,119 acres or 4% of the region. The region does not have an agricultural zone, however agricultural land uses tend to be consistent with low density residential zoning. Although a relatively small portion of land is dedicated to agriculture, there are over 400 farms in the region. These include large commercial operations as well as small family farms.

The geography of the region promotes a wide range of agricultural uses. The Connecticut River Valley contains highly productive soil and the region's proximity to the Long Island Sound results in a slightly longer growing season than other areas in New England. Prime agricultural farm soils are shown in Figure 4-5. There are approximately 38,200 acres of prime agricultural farm soils and approximately 24,400 acres of soils of statewide importance throughout the region. According to the 2017 USDA census, the number of farms in Middlesex County (which does not include Lyme and Old Lyme) that were less than 50 acres grew by 69.0% from 2007 to 2017 while the total number of farms increased by only 12.2% during the same period.[6] This indicates a trend toward smaller farms.

PA 490

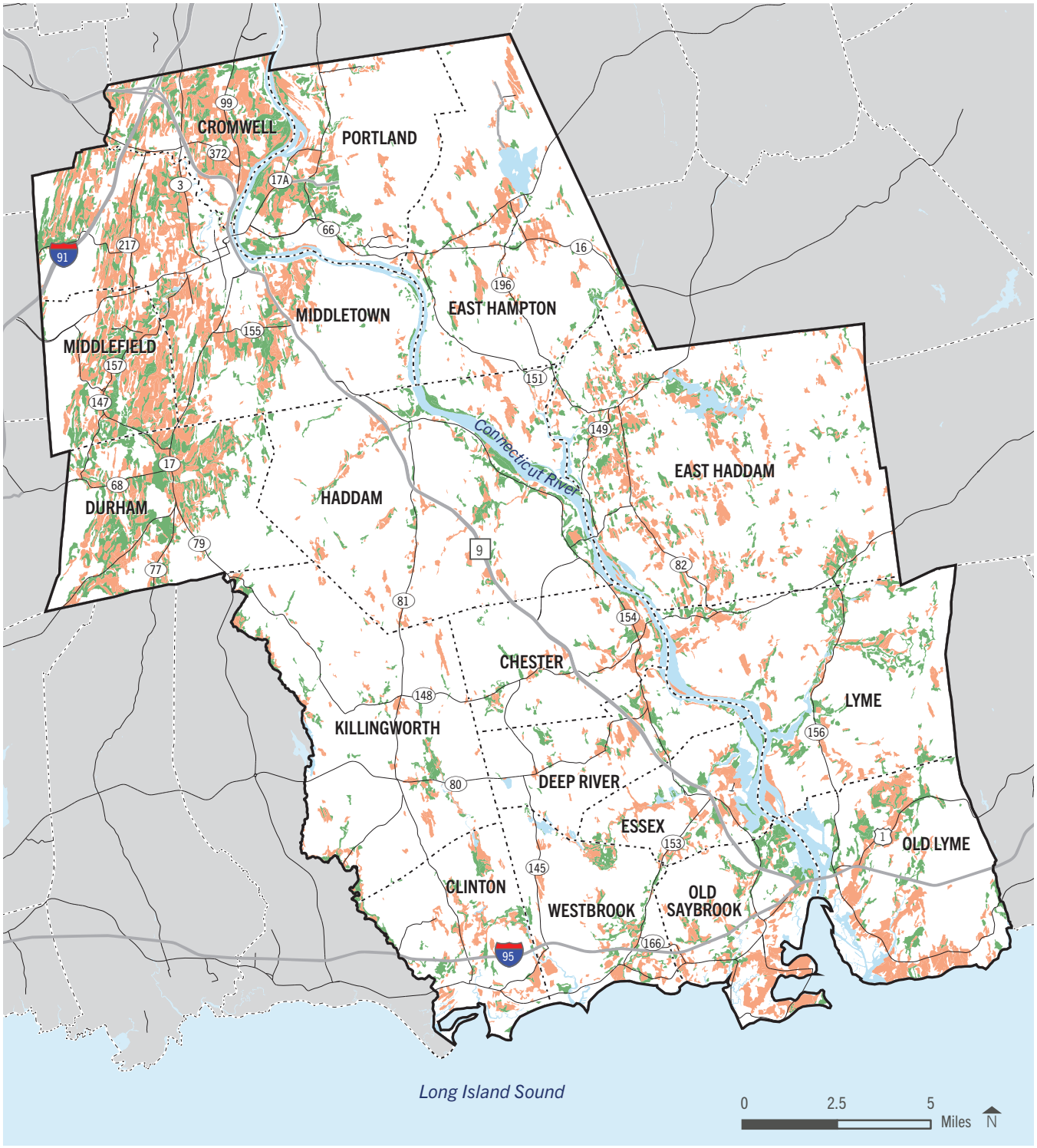
PA 490 is the single most important farming legislation codified in the Connecticut General Statutes. PA 490 enables land owners to pay tax on PA 490 land at its current value rather than its highest value (i.e. as farmland rather than as potential housing development). This helps reduce the financial strain on farms and helps to prevent the forced conversion of farm, forest, and open space lands to more intensive uses as a result of property taxation that is incompatible with current land uses. Unlike many tax statutes, PA 490 includes a Declaration of Policy, which is public policy making it within the public interest to encourage the preservation of these lands to maintain a readily available source of food and farm products close to the metropolitan areas of the state.

Source: Connecticut Department of Agriculture. Public Act 490- the Basics. Retrrieved from: https://portal.ct.gov/DOAG/Commissioner/Commissioner/Public-Act-490---The-Basics

Harvesting Hay in Durham

Source: F. DeFelice, RiverCOG

Figure 4-5. Agricultural Soils



Agricultural Soils

Soils of Statewide Importance

Source: CT OPM Data

OPEN SPACE

The open space land use designation is attributed to any parcel of land owned by the Federal, State, or local land trust that's purpose is to hold the land as open space in perpetuity. As can be seen in Table 4-1 and Figure 4-1, open space land use accounts for approximately 44,842 acres or 16% of the region. The region does not have an equivalent open space zone; however, as mentioned above, the low-density residential zone is generally considered compatible with the open space land use designation. The open space designation also overlaps with the conservation zone, which accounts for 7,328 acres or roughly 3% of the region. As shown in Figure 4-2, open space land use is scattered throughout the region, with large concentrations located in towns east of the Connecticut River, as well as in Haddam, Chester, Deep River, and Killingworth. This is consistent with the conservation zone shown in Figure 4-4. Open space in the region is characterized by native forested habitat and wetlands which may contain walking or biking paths and scenic viewpoints.

SPECIAL CATEGORIES

Village Centers

The region's historic village centers are a cherished asset and serve as the heart of many of the region's municipalities. These traditional New England village centers often contain a mixture of uses: residential dwellings alongside commercial establishments (restaurants, shops, and other businesses), and, often, civic and institutional uses (schools, municipal buildings, and museums).

There is a considerable range in style, scale, and density of the various municipal cores around the region. For example, Middletown's Main Street has a mix of three to five-story buildings with restaurants, shops, or offices on the bottom floors and residences above. In comparison, Main Street in Essex, adjacent to the North and Middle Coves of the Connecticut River, has a mix of restaurants, offices, shops, and residences, but retains much of the character and buildings from the late 18th and early 19th century.

The State of Connecticut has identified Village Center Priority Funding Areas, which are defined as "traditional village centers" and were delineated in the 2013-2018 State Plan of Conservation and Development. These State Designated Village Centers are shown in Figure 4-6and Table 4-3 provides a breakdown of zoning within each. One quarter of the Village Center land area is zoned for mixed use or high-density residential development. However, commercial and medium density residential zoning predominate as resistance to new mixed-use or commercial development in these areas is prevalent. It is important to note that not all of the region's historic village centers are incorporated in the state designated Village Centers, even though the latter were developed with municipal input.

Historic and Village Districts

Municipalities often protect their village centers by designating then as Historic or Village Districts. A Historic District or Village District offers the municipality the opportunity to enact significant architectural controls and require architectural changes to be reviewed by a local preservation commission. This allows towns to ensure that alterations, additions or demolitions to historically significant buildings and are in keeping with special character of the designated district. These Historic/Village Districts are mapped in Figure 4-6 and listed in Table 4-4. Not all of the region's historic village centers have been incorporated into a Historic or Village District.

Table 4-3. Zoning in Village Centers

Land Zoned for Development	Acreage	Percent
Commercial	340.4	24%
Conservation	8.3	1%
Flood Plain	8.0	1%
High Density Residential < 20,000ft	17.8	1%
Industrial	82.1	6%
Low Density Residential > 1 acre	181.8	13%
Medium Density Residential > 20,000ft, < 1 Acre	398.1	28%
Mix Use, Commercial and Industrial	29.2	2%
Mix Use, Residential and Commercial	326.0	23%
Mixed Use Urban, Residential, Commercial, Light Industrial	5.7	0%
Right of Way	25.3	2%
Water	8.6	1%
Grand Total	1431.3	

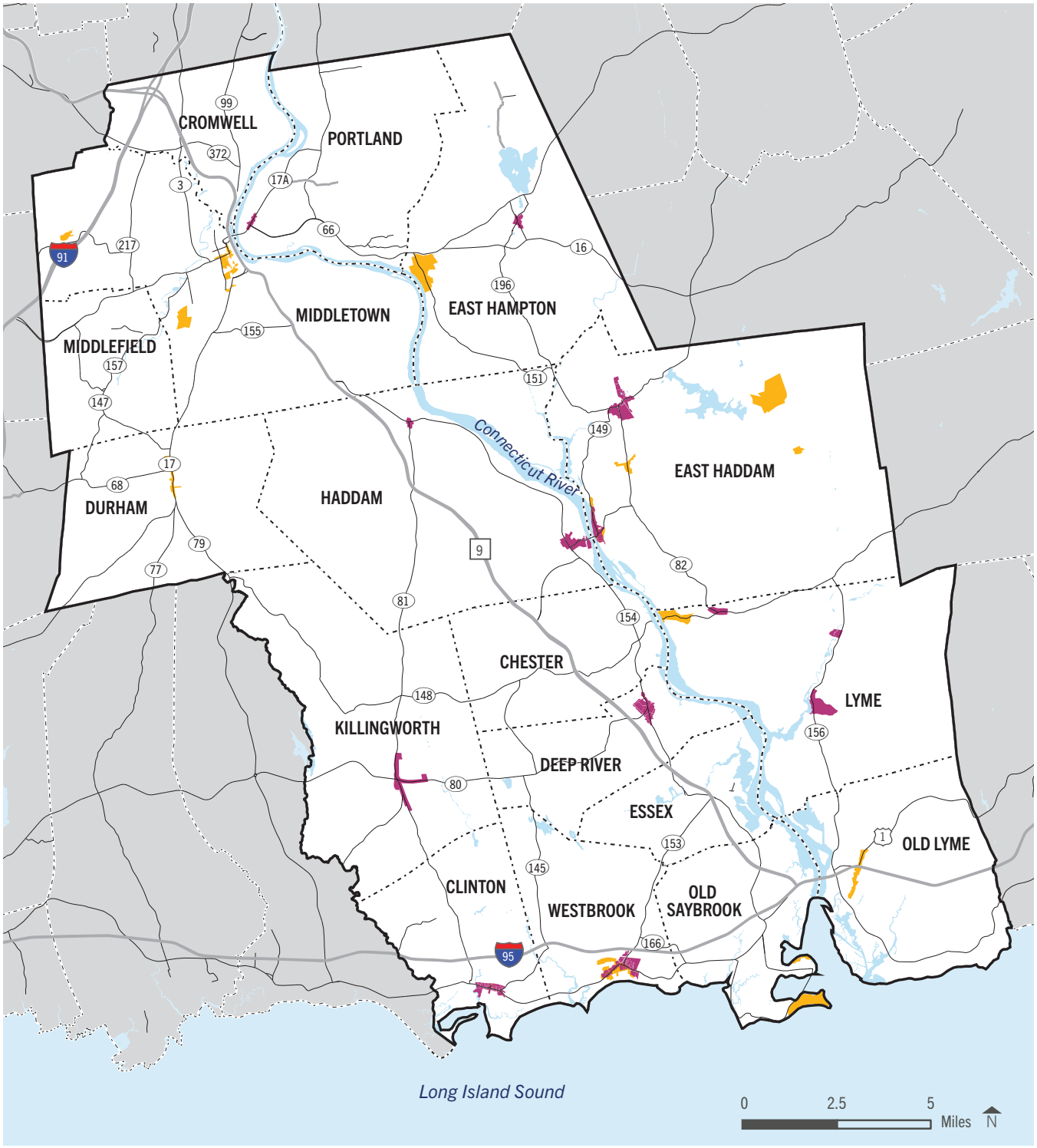
Source: RiverCOG Seamless Parcel Layer, 2013

Table 4-4. Historic Districts

District	Town	Acres
Borough of Fenwick H.D.	Old Saybrook	36.2
Middle Haddam H.D.	East Hampton	47.5
North Cove Road H.D.	Old Saybrook	4.7
Millington Green H.D.	East Haddam	4.4
Liberty Green H.D.	Clinton	1.2
Old Lyme H.D.	Old Lyme	16.7
East Haddam H.D.	East Haddam	19.1
Little Haddam H.D.	East Haddam	8.8
Durham H.D.	Durham	12.2
Wickham Sawmill H.D.	East Haddam	59.3
Hadlyme Ferry H.D.	Lyme	21.8

Source: RiverCOG Seamless Parcel Layer, 2013

Figure 4-6. Village Centers and Historic Districts



Village Center Priority Funding Areas*

Historic Districts

*As delineated in the 2013-2018 State Plan of Conservation and Development

Source: CT OPM Data

Transit-Oriented Development

The State of Connecticut requires all regional plans of conservation and development to, "identify areas where it is feasible and prudent to have compact, transit accessible, and pedestrian-oriented mixed-use development patterns and land reuse, and to promote such development patterns and land reuse." To be effective, a transit-oriented development pattern should be encouraged within a half mile radius of a major transit station. This is because a half mile is generally considered a standard measure of walkability - the distance a person could be expected to walk in order to reasonably reach a destination by foot.

As discussed further in the Mobility section, major transit stations in the region are located in Clinton, Middletown, Old Saybrook, and Westbrook. Table 4-5 provides a breakdown of zoning within a half mile of each of these transit stations which can be summarized as follows:

- **Clinton:** Clinton has the highest proportion of low-density and high-density zoning near its transit station and has high proportions of commercial and industrial zoning. This may serve to support a mixed-use district without the need for mixed-use zoning on individual properties.
- **Old Saybrook:** The high proportion of commercial zoning in Old Saybrook limits the amount of residential growth that is likely to occur in that area. This is compounded by a lack of higher-density residential zoning. Despite the zoning limitations, Old Saybrook boasts the largest transit-oriented apartment complex in the region near its historic rail depot served by Amtrack and Shoreline East commuter rail.
- **Middletown:** The area surrounding the Middletown bus passenger terminal is well zoned to promote transit-oriented development with high proportions of both mixed use and high-density residential zoning.
- **Westbrook:** The Westbrook transit area is not zoned to support transit-oriented development, with more than 65% of the land zoned for low-density development.

A high proportion of mixed-use zoning, which would greatly support transit-oriented development, is notably lacking in all municipalities with the exception of Middletown.

Post and Main Apartments, Old Saybrook

Source: liveoakcontracting.com

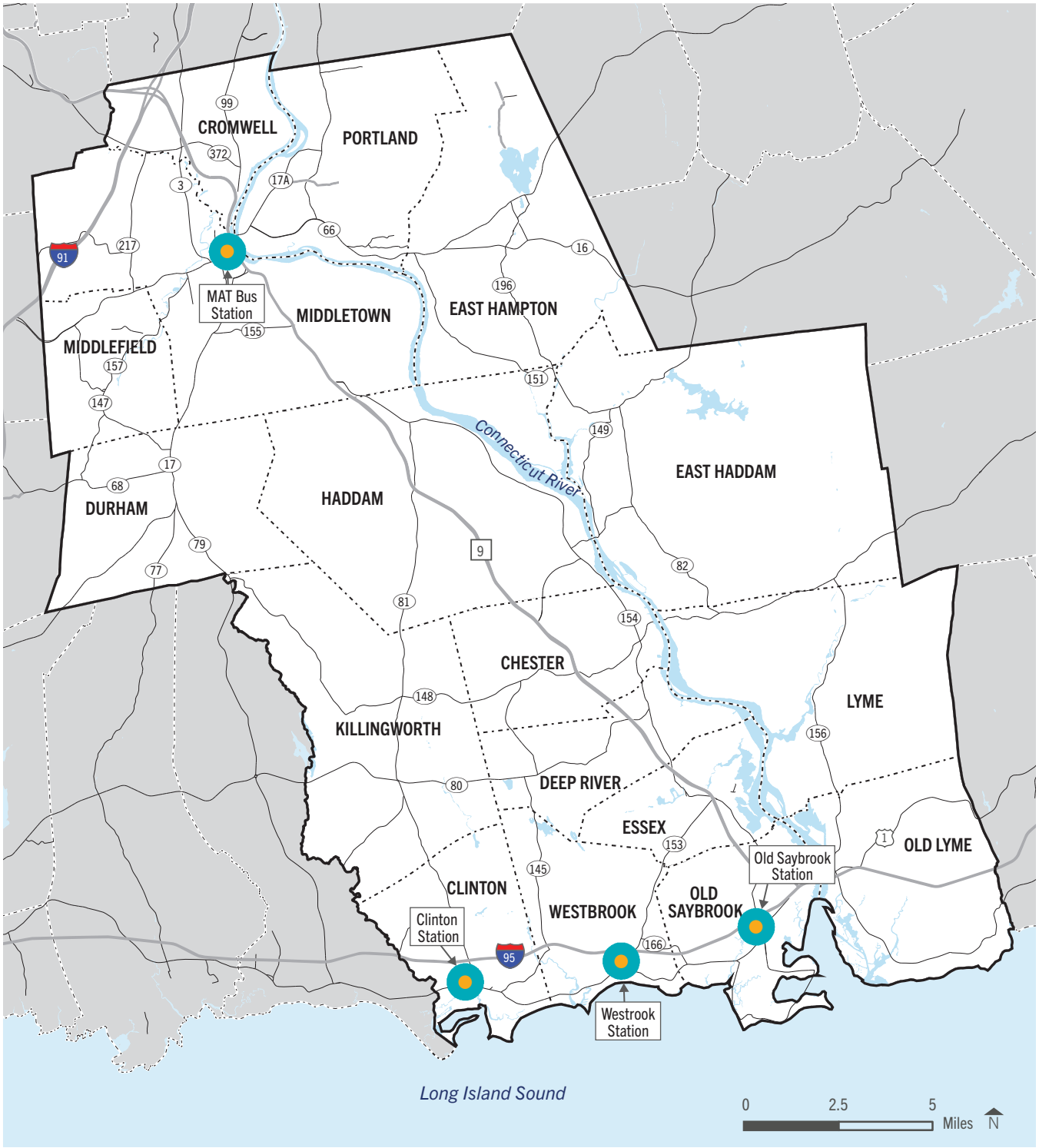
Source: liveoakcontracting.com

Table 4-5. Zoning withing 1/2 Mile of Transit

	Clinton		Middletown		Old Saybrook		Westbrook		Grand Total	
	acres	*percent*	*acres*	*percent*	*acres*	*percent*	*acres*	*percent*	*acres*	*percent*
High Density Residential	163	32%	63	23%	1	0%	25	5%	252	15%
Medium Density Residential	91	18%	0	0%	92	23%	326	65%	509	30%
Low Density Residential	66	13%	0	0%	0	0%	1	0%	67	4%
Mix Use (Residential and Commercial)	56	11%	141	51%	3	1%	52	10%	253	15%
Commercial	61	12%	1	0%	157	40%	61	12%	279	17%
Institutional	0	0%	38	14%	0	0%	0	0%	38	2%
Conservation	0	0%	17	6%	0	0%	0	0%	17	1%
Mix Use, Commercial and Industrial	66	13%	14	5%	140	36%	37	7%	258	15%

Source: RiverCOG Seamless Parcel Layer, 2013

Figure 4-7. 1/2 Mile Walkability Buffer



Train Station (Bus in Middletown)

1/2 Mile Walkability Buffer

Source: CT Department of Transportation, RiverCOG

KEY TAKEAWAYS

- *Residential land use is the most prevalent in the region at 106,988 acres or 38% of the region*
- *Residential zoning accounts for 243,515 acres or 86% of the region. Low density residential (< 1 du/ac) accounts for 172,480 acres or 60% of the region.*
- *Agricultural land use accounts for approximately 11,119 acres or 4% of the region, however the region contains approximately 400 farms.*
- *According to the 2017 USDA census, the number of farms in Middlesex County (which does not include Lyme and Old Lyme) that were less than 50 acres grew by 69.0% from 2007 to 2017 while the total number of farms increased by only 12.2% during the same period.*
- *One quarter of the land area is zoned for mixed use or high-density residential development. However, commercial and medium density residential zoning predominate.*
- *Thirty percent of all land within a ½ mile of transit stations is zoned medium density residential, which is inconsistent with state objectives regarding transit-oriented development Only 15% of land around these transit stops is zoned for mixed use development.*

ENDNOTES

1 Defined as any parcel that is owned by a government, university or nonprofit organization that is not an open space parcel.

2 Defined as any parcel that is owned privately and is not currently developed or utilized.

3 CT DECD Housing and Income Data: Building Permit Data, Annual Demolition Data by town. Retrieved from: https://portal.ct.gov/DECD/Content/About_DECD/Research-and-Publications/01_Access-Research/Exports-and-Housing-and-Income-Data

4 CT DECD Housing and Income Data: Building Permit Data, Annual Demolition Data by town. Retrieved from: https://portal.ct.gov/DECD/Content/About_DECD/Research-and-Publications/01_Access-Research/Exports-and-Housing-and-Income-Data

5 CT DECD Housing and Income Data: Building Permit Data, Annual Demolition Data by town. Retrieved from: https://portal.ct.gov/DECD/Content/About_DECD/Research-and-Publications/01_Access-Research/Exports-and-Housing-and-Income-Data

6 U.S. Department of Agriculture. 2017 Census of Agriculture. Selected Operation and Producer. Retrieved from: https://www.nass.usda.gov/Quick_Stats/CDQT/chapter/2/table/45/state/CT/county/007

5. HOUSING

5.1 INTRODUCTION

This section provides an overview of the current housing supply in the Lower Connecticut River Valley region with a particular focus on the region's supply of "affordable" units as that term is defined in this section. It also raises several factors operating in the region that may limit the availability of certain housing types, particularly "affordable" units.

5.2 HOUSING FORM AND LOCATION

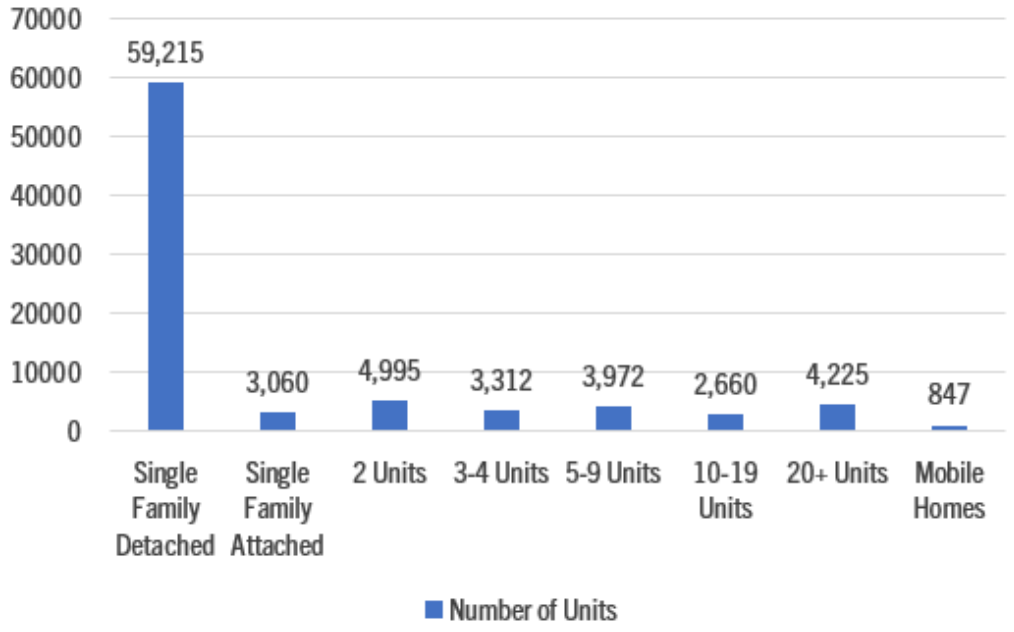
FORM OF HOUSING

The region currently has a supply of 82,313 housing units. The form, size, and location of these housing units has dramatic impacts on price as well as the suitability of the housing to meet the economic, social, and physical needs of the region's residents. A vast majority of homes in the region are detached single family units; more than twice the other housing types combined. This proportion is roughly 13% higher than that of Connecticut as a whole. Figure 5-1 summarizes this data for the region and Table 5-1 provides a breakdown of housing unit types for each municipality within the region.

As can be seen in Table 5-1, Middletown provides the greatest portion of the region's housing, roughly 25%, as well as the greatest variety of housing types. In contrast, Lyme provides the least amount of housing, roughly 1.5%, and the least variety in housing type. Of its 1,202 units, only 22 are not detached single family units.

Figure 5-1. Total Housing Units by Development Type

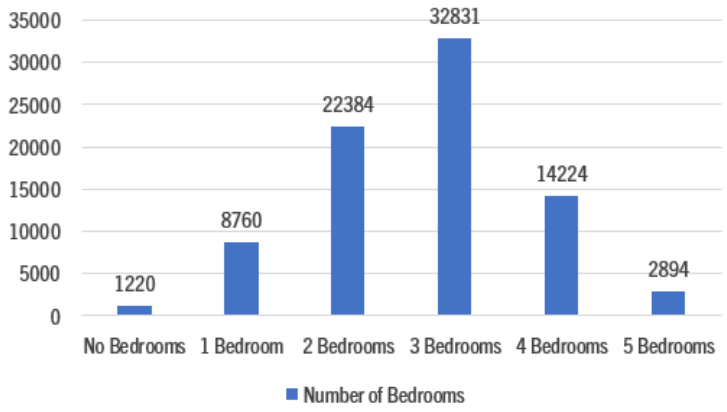
US Census Bureau, American Community Survey 2014-2018



DEMOGRAPHICS RECAP (FROM SECTION 3)

- *The overall population in the region is expected to decrease by 2.6% by 2040. As of 2018, the region had an estimated population of 173,268.*
- *The median age in the region is 45.6, an 18% increase from 2000. Lyme has the highest median age of 54.7 and Middletown has the lowest at 36.6. Five towns have a median age over 50.*
- *The region is home to an estimated 33,057 individuals over 65 years of age and the elderly population is expected to increase by more than 8,000 individuals by 2040.*
- *In 2017, 35.7% of households in the region were non-family households; an increase of 14.3% from 2000. As defined by the US Census Bureau, a non-family household is an individual living alone or sharing a home exclusively with people to whom they are not related.*
- *In 2017, married couple families accounted for 52% of all households in the region.*
- *In 2017, individuals living alone accounted for 29% of households in the region - 42% of single-person households were individuals over age 65.*

Figure 5-2. Number of Bedrooms



US Census Bureau, American Community Survey 2014–2018

Historic Home in Haddam

Source: RiverCOG

Table 5-1. Housing Unit Types by Municipality

	Single Family Detached	Single Family Attached	Duplex	3-4 Units	5-9 Units	10-19 Units	20+ Units	Mobile Homes	Total Units
Chester	1,587	8	56	82	37	73	159	0	2,002
Clinton	4,881	131	342	152	190	216	86	236	6,234
Cromwell	3,558	999	220	290	404	225	465	0	6,161
Deep River	1,492	74	180	97	48	106	100	24	2,121
Durham	2,555	32	60	130	0	0	0	17	2,794
East Haddam	4,101	36	249	44	99	37	44	0	4,610
East Hampton	4,746	297	246	154	106	0	21	10	5,580
Essex	2,611	142	235	194	53	0	148	0	3,383
Haddam	3,148	49	115	51	98	0	69	0	3,530
Killingworth	2,011	14	64	13	0	0	0	309	2,411
Middlefield	1,781	53	69	18	0	32	7	21	1,981
Middletown	9,251	884	1952	1406	2596	1785	3094	17	20,985
Old Saybrook	4,952	122	224	176	237	68	0	21	5,800
Portland	3,505	64	447	208	10	52	32	0	4,318
Westbrook	3,460	98	294	124	70	0	0	168	4,214
Lyme	1,180	5	8	0	9	0	0	0	1,202
Old Lyme	4,396	52	234	173	15	66	0	51	4,987
Region	**59,215**	**3,060**	**4,995**	**3,312**	**3,972**	**2,660**	**4,225**	**874**	**82,313**

US Census Bureau, American Community Survey 2014-2018

HOUSING AND HOUSEHOLD SIZE

The number of bedrooms in a housing unit can be an indicator of its size, price, and suitability for different household types. A greater number of bedrooms is typically associated with a more expensive housing unit, or a unit more suitable for larger households. Figure 5-2 provides a breakdown of the number of bedrooms for each of the region's housing units. A majority of housing units in the region have three bedrooms (32,831), a sizeable number have two bedrooms (22,283), and a relatively small number have no bedroom (studio) or 5 bedrooms (1,220 and 2,894 respectively).[1] This dispersal of housing units relates relatively well to the average household size for homeowners in the region of 2.48 persons. However, the average household size for renters is slightly lower (2.09 persons) and 29% of the region's households in 2018 were individuals living alone.[2] This suggests a need for smaller units to accommodate this population. The average household sizes for renters and homeowners across the region are shown in Table 5-2.

HOUSING TENURE AND VACANCY RATES

Housing tenure and vacancy rates are important indicators of the supply and cost of housing. Housing tenure refers to whether a housing unit is owned or rented. The tenure distribution of a region's housing stock can be an indicator of several aspects of the housing market, including the affordability of units, household stability and residential mobility.

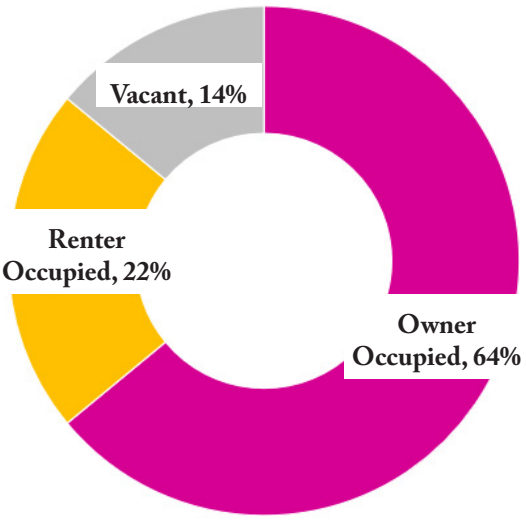
Figure 5-3 and Table 5-3 provide a breakdown of renter occupied units, owner occupied units, and vacant units in the region. The ratio of homeowners to renters in the region is approximately 3:1.[3] In comparison, the ratio in the state of Connecticut is approximately 2:1. Within the region, the city of Middletown has the largest number of renter occupied units (8,972) followed by Cromwell and Clinton (1,370 and 1,137 respectively).[4] These municipalities also have the highest overall number of housing units. The town of Lyme has the fewest renter-occupied units (139) followed by Killingworth (164), Middlefield (238) and Durham (253).[5] Younger residents, older residents and one or two-person households tend to prefer rental units due to their flexibility, lack of maintenance requirements, and absence of a down payment. Because the region has a growing senior population and a significant number of single-person households, the provision of additional rental units would be beneficial. In addition, younger generations are waiting longer to purchase homes and start families. Rental units may assist the region in attracting or retaining younger residents who do not desire, are not ready for, or cannot yet afford, homeownership.

Table 5-2. Average Household Size

	Average Household Size (Owners)	Average Household Size (Renters)
Chester	2.6	1.6
Clinton	2.4	2.1
Cromwell	2.5	1.8
Deep River	2.5	1.9
Durham	2.7	2.8
East Haddam	2.5	2.0
East Hampton	2.6	2.4
Essex	2.3	1.7
Haddam	2.6	2.4
Killingworth	2.8	2.7
Middlefield	2.5	2.0
Middletown	2.4	2.0
Old Saybrook	2.3	2.4
Portland	2.5	2.0
Westbrook	2.3	2.0
Lyme	2.3	2.2
Old Lyme	2.4	1.9
Region	**2.5**	**2.1**

US Census Bureau, American Community Survey 2014-2018

Figure 5-3. Housing Occupancy Status



US Census Bureau, American Community Survey 2014-2018

Table 5-3. Housing Occupancy Status by Municipality

	Total housing units	Percent of Region's Housing	Vacant Housing Units	% of Units	Owner Occupied Units	% of Units	Renter Occupied Units	% of Units
Middletown	20,985	25.5	1931	9.2	10,082	52.9	8,972	47.1
Cromwell	6,161	7.5	342	5.6	4,449	76.5	1,370	23.5
Clinton	6,234	7.6	774	12.4	4,323	79.2	1,137	20.8
Old Saybrook	5,800	7	1,446	24.9	3,470	79.7	884	20.3
Essex	3,383	4.1	373	11	2,290	76.1	720	23.9
Westbrook	4,214	5.1	1,137	27	2,430	79	647	21
Portland	4,318	5.2	476	11	3,210	83.6	632	16.4
East Hampton	5,580	6.8	605	10.8	4,350	87.4	625	12.6
Old Lyme	4,987	6.1	1,798	36.1	2,581	80.9	608	19.1
Haddam	3,530	4.3	321	9.1	2,651	82.6	558	17.4
East Haddam	4,610	5.6	927	20.1	3,130	85	553	15
Deep River	2,121	2.6	229	10.8	1,390	73.5	502	26.5
Chester	2,002	2.4	282	14.1	1,345	78.2	375	21.8
Durham	2,794	3.4	129	4.6	2,412	90.5	253	9.5
Middlefield	1,981	2.4	154	7.8	1,589	87	238	13
Killingworth	2,411	2.9	106	4.4	2,141	92.9	164	7.1
Lyme	1,202	1.5	142	11.8	921	86.9	139	13.1
Region	**82,313**	**100%**	**11,172**	**14**	**52,764**	**64**	**18,377**	**22**

US Census Bureau, American Community Survey 2014–2018

Beach Community in Westbrook

Source: RiverCOG

Vacant units include units that are readily available to prospective tenants or homebuyers, as well as vacant seasonal and migratory units (such as student or temporary workforce housing) that are generally unavailable to the public. The vacancy rate reflects relationship between the region's housing costs, supply, and demand. It indicates what portion of the housing stock is available to prospective tenants or homebuyers for occupancy.

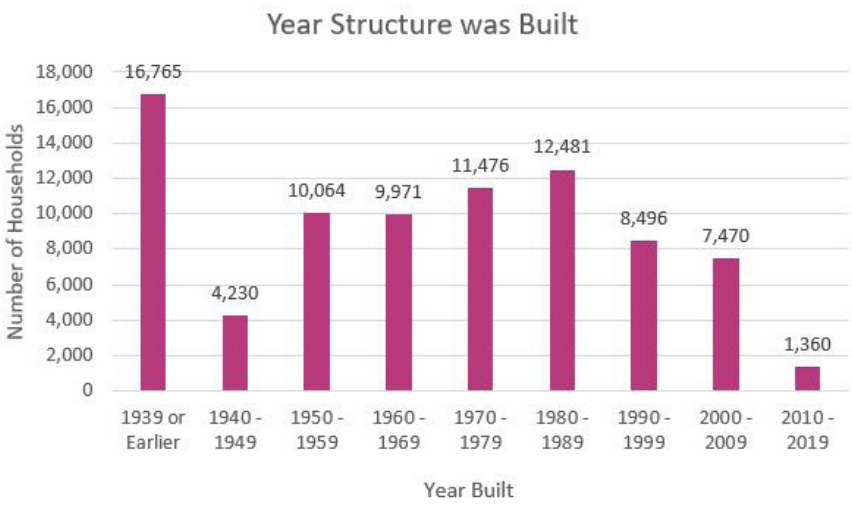
Overall, the region has a vacancy rate of 14%.[6] However, the vacancy rates for individual towns is much higher. This is likely because seasonal and student housing is not counted as owner occupied or renter-occupied housing. As of 2017, the region was estimated to have 5,602 "seasonal, recreational, or occasional use" housing units, 45% of which are located in Old Lyme (vacancy rate of 36%) and Old Saybrook (vacancy rate of 25%).[7] While such housing is critical to the summer economy and culture, it does not contribute to the supply of resident housing.

HOUSING AGE AND CONDITION

Housing age is commonly used to estimate the rehabilitation needs of an areas housing stock. Typically, most homes begin to require major repairs or rehabilitation at 30 or 40 years of age. Figure 5-4 provides a breakdown of housing units built during each decade. During the periods of 1990 – 1999 and 2000 – 2009, the region saw an increase in the number of homes by roughly 7,500 and 8,500 respectively.[8] Between 2010 and 2018, that number dropped down to 1,360. Approximately 63% of the region's housing stock was built prior to 1980 and 20% was built prior to 1940. This is not to say that 63% of the region's housing is in disrepair, but it suggests a greater need for housing maintenance and rehabilitation. Housing that is not maintained can discourage reinvestment, depress surrounding property values, and can negatively impact the quality of life in a neighborhood.

This data is reinforced by an examination of building permits for housing, in the region,

Figure 5-4. Housing Units by Age Group



US Census Bureau, American Community Survey 2015-2019

Apartment Complex in Cromwell

retrieved from the Connecticut Department of Economic Community Development, which shows that from 2010 to 2017, every municipality, except for Chester and Essex, saw the net number of new houses being built drop by 50% or more.[9] Five of the region's municipalities experienced an over 85% decrease in new houses built. This trend correlates with the decrease in the region's population following 2010.[10] With more homes coming on the market due to out-migration and the loss of older residents, the demand for new housing has decreased substantially.

5.3 HOME VALUES AND RENTAL RATES

HOME VALUES

As of 2018, the median home value in the region was $325,494. This is higher than the median home value for the state of Connecticut ($272,700).[11] Table 5-4 provides a breakdown of home values by municipality, as well as median values and regional totals. The largest portion of homes in the region (42%) are valued between 200,000 and $500,000 with 16,534 homes valued between $200,000 and $299,999 and 18,285 homes valued between $300,000 and $499,999.[12] A majority of homes valued at under $200,000 are located in Middletown (4,011), followed by Cromwell (1,469), East Hampton (988), and Clinton (801).[13] Lyme has the fewest number of homes valued under $200,000, a total of 40. Lyme also has the highest median home value in the region ($555,000); almost double that of Middletown, which has the lowest median home value ($227,000).[14]

Charting regional home value data over time demonstrates that, across the region, home values significantly increased from the late 1990s through the 2008 financial crisis. This increase was particularly prevalent in municipalities with the highest home values. However, these municipalities also suffered the greatest loss in home values as a result of the financial crisis. Municipalities with lower home values were less affected. No municipality has fully recovered from the 2008 crisis and housing values have remained relatively constant since 2012. These trends are consistent with those seen across the state of Connecticut.

Table 5-4. Home Values by Municipality

	Less than $50,000	$50,000 -$99,999	$100,000 -$149,999	$150,000 - $199,999	$200,000 -$299,999	$300,000 - $499,999	$500,000 -$999,999	$1,000,000 or more	Median
Middletown	170	466	1362	2,013	3,288	2,600	163	20	$227,000
Cromwell	119	101	391	858	1,509	1,087	373	11	$245,600
Portland	74	50	118	504	1,418	924	122	0	$245,800
East Hampton	63	13	174	738	1,738	1,403	194	27	$268,100
Deep River	49	49	45	115	632	403	76	21	$271,200
East Haddam	52	36	146	325	1,268	908	357	38	$278,700
Middlefield	25	9	13	143	733	572	94	0	$280,400
Clinton	182	59	192	368	1,583	1,511	332	96	$287,700
Haddam	11	26	28	293	899	1,044	301	49	$310,400
Durham	16	17	29	143	816	972	391	28	$331,300
Chester	11	0	36	52	372	687	187	0	$346,800
Killingworth	55	49	184	119	252	1,059	371	52	$365,400
Westbrook	90	119	70	171	382	1,083	394	121	$365,800
Essex	53	19	142	36	509	943	435	153	$371,300
Old Saybrook	47	24	21	121	663	1,603	803	188	$381,900
Old Lyme	37	9	33	170	378	1,207	576	171	$401,000
Lyme	5	0	10	25	94	279	370	138	$555,000
Region	**1,059**	**1,046**	**2,994**	**6,194**	**16,534**	**18,285**	**5,539**	**1,113**	$325,494

US Census Bureau, American Community Survey 2014-2018

RENTAL RATES

As of 2018, the average rental rate for occupied units paying rent in the region was $1,200. This rate varies by municipality, with Old Saybrook having the highest average rate of $1,514 and Haddam having the lowest rate of $879.[15] Approximately 43% of the region's rental housing (7,324 units) rented at between $1,000 and $1,500 per month. In addition, 33% of units (5,733 units) rented for under $1,000 per month while 24% of units (4,162 units) rented for more than $1,500.[16] These rental rates apply to the overall supply of rental units in the region and do not distinguish between the size or quality of the units. These rates are consistent with the State of Connecticut as a whole. A visual representation of rental rates in the region is shown in Figure 5-5 and Table 5-5.

Figure 5-5. Rental Rates

US Census Bureau, American Community Survey 2014–2018

Table 5-5. Rental Rates by Municipality

	Less than $500	$500 - $999	$1,000 -$1,499	$1,500 -$1,999	$2,000 - $2,499	$2,500 -$2,999	$3,000 or more	Median (dollars)
Haddam	71	198	59	15	27	35	0	$879
Essex	56	232	160	142	18	0	0	$1,031
East Haddam	41	179	209	31	28	0	0	$1,039
Portland	36	168	290	103	0	0	0	$1,116
Middletown	1,005	2,222	3,757	1,441	169	0	61	$1,132
Deep River	0	127	230	55	38	0	0	$1,167
Durham	15	0	105	38	19	0	0	$1,175
Killingworth	0	37	76	14	37	0	0	$1,176
Clinton	65	265	417	262	59	17	0	$1,210
East Hampton	31	84	277	178	8	0	0	$1,215
Cromwell	197	195	520	198	84	0	83	$1,218
Old Lyme	55	71	292	118	8	10	26	$1,237
Westbrook	48	58	346	116	18	18	12	$1,248
Middlefield	56	24	65	60	0	0	0	$1,307
Chester	15	88	122	87	29	0	17	$1,315
Lyme	0	5	73	34	0	12	0	$1,426
Old Saybrook	46	43	326	276	97	50	8	$1,514
Region	**1,737**	**3,996**	**7,324**	**3,168**	**639**	**142**	**207**	**$1,200**

US Census Bureau, American Community Survey 2014–2018

5.4 HOUSING AFFORDABILITY

DEFINING AFFORDABLE HOUSING

For the purposes of this report, the concept of affordable housing will refer to the creation of a variety of housing types, for sale and rent, that are accessible and available to and meet the needs of a population diverse in age, income, household size, and ability. This definition challenges outdated preconceptions of affordable housing by recognizing that the market for affordable housing is varied – from the adult children of residents who are starting in their careers, to the parents of residents who are on a fixed-income, to the region's teachers, contractors, landscapers, healthcare workers, and retail salespersons, to wounded veterans that have a diminished ability to work. Each of these groups deserves safe housing but may not be able to afford the market rates in our region.

There are many ways to measure affordability under the umbrella of affordable housing. This section will examine several of these methods along with the region's provision of housing stock under each.

HOUSING AND URBAN DEVELOPMENT (HUD) AFFORDABILITY

One measurement of housing affordability is the HUD Metro Fair-Market-Rent Areas (HMFA).[17] The Department of Housing and Urban Development (HUD) calculates the area median income (AMI) for these HMFAs and sets income and maximum rent standards for their various housing programs. For instance, HUD limits the Section 8 rental subsidy program to households earning 80% or less of AMI (adjusted for family size and by zip code) and sets the maximum rent at 30% of that 80% AMI level. Additional HUD programs provide aid to households earning between 30% and 50% of AMI (i.e. very low income) or less than 30% of AMI (extremely low-income).[18]

The region is split among three different HMFAs, each with their own HUD defined AMI. However, because the region has a high median income, high rents can be charged for these HUD approved units. Conversely, due to the geography the AMIs, two of the region's municipalities with high median incomes and highest housing values, Lyme and Old Lyme, have a lower AMI than the rest of the region. This means that substantially lower rates would be required in those municipalities that if their AMI had been calculated independently.

STATUTORY AFFORDABILITY (C.G.S. SECTION 8-30G)

Connecticut General Statutes Section 8-30g Affordable Land Use Appeals Law was enacted in 1990 in order to facilitate more affordable housing development.[19] The Statute allows affordable housing developers that have had a project rejected by a zoning commission in a municipality where less than 10% of the total housing units are affordable, to appeal the decision.[20] In this appeal process, the burden of proof is on the municipality to demonstrate on the existing record that the proposed residential development poses a health, safety, or welfare issue to the municipality.[21] The state court can overturn the zoning commission's rejection, even if the proposal does not conform to local zoning regulations.

If a municipality wishes to be exempt from the 8-30g appeals process, at least 10% of their housing units must be affordable, as defined by the statute.[22] The statute defines affordable housing as housing that meets one of the following criteria:

- Deed restricted as affordable;
- Governmentally assisted;
- House tenants receiving tenant rental assistance;
- Have a Connecticut Housing Finance Authority (CHFA) or US Department of Agriculture (USDA) mortgage; or
- Government assisted living units.

Municipalities are eligible for a "temporary suspension of procedure" or moratorium on being subject to 8-30g appeals if they can show that there have recently been sufficient affordable units created that earn 50 Housing Unit Equivalent (HUE) points. These points are doled out based on the type of affordable housing created – an owner-occupied unit that is deed restricted to households earning no more than 80% AMI is worth 1 HUE point while a rental unit restricted to households earning no more than 60% AMI is worth 2.23 HUE points. There are also additional bonuses to the value of these units based on their being located in a Housing Incentive Zone (IHZ) or meeting other criteria. If a municipality earns the necessary points, they can apply for a four-year moratorium.[23] Table 5-6 provides a breakdown of 8-30g affordable units in the region by municipality.

Approximately 8% of housing units in the region qualify as affordable units pursuant to 8-30g. These will be referred to as "statutorily affordable" units.[24] Middletown is the only municipality in the region to be considered 8-30g exempt as approximately 22% of its housing meets the standards for statutorily affordable units.[25] In fact, Middletown accounts for roughly 70% of the regions supply of statutorily affordable housing.[26]

One criticism of 8-30g is that it creates housing which may not actually be affordable. In areas with high median income, like the LCRV region, units may be statutorily affordable for those earning up to 80% of AMI, but the cost may exceed that of the region's market priced units. In addition, the region has a supply of older, smaller housing units which may be affordable, but because they do not meet specific 8-30g criteria, they are not considered statutorily affordable and cannot count toward the 10% quota.

Despite its shortcomings, 8-30g is a tool that developers and municipalities in the region can use to create affordable housing that may not otherwise be permitted pursuant to local zoning restrictions, though in the 30 years since its enactment, 8-30g has not adequately addressed the affordable housing needs of the region.

Table 5-6. 8-30g Units by Municipality

2019 Affordable Housing Appeals List- Exempt Municipalities							
Town	Total Housing Units 2010 Census	Government Assisted	Tenant Rental Assistance	Single Family CHFA /USDA Mortgages	Deed Restricted Units	Totally Assisted Units	Percent Affordable under Section 8-30g
Middletown	21,223	3,019	1,068	520	25	4,632	21.83%

2019 Affordable Housing Appeals List- Non-Exempt Municipalities							
Town	Total Housing Units 2010 Census	Government Assisted	Tenant Rental Assistance	Single Family CHFA /USDA Mortgages	Deed Restricted Units	Totally Assisted Units	Percent Affordable under Section 8-30g
Chester	1,923	23	3	16	0	42	2.18%
Clinton	6,065	105	8	58	0	171	2.82%
Cromwell	6,001	212	8	197	0	417	6.95%
Deep River	2,096	26	5	30	0	61	2.91%
Durham	2,694	36	1	27	0	64	2.38%
East Haddam	4,508	73	5	59	0	137	3.04%
East Hampton	5,485	70	5	86	25	186	3.39%
Essex	3,261	58	4	21	16	99	3.04%
Haddam	3,504	22	1	27	0	50	1.43%
Killingworth	2,598	0	0	19	5	24	0.92%
Lyme	1,223	0	0	4	8	12	0.98%
Middlefield	1,863	30	3	19	1	53	2.84%
Old Lyme	5,021	60	1	18	3	82	1.63%
Old Saybrook	5,602	50	10	22	73	155	2.77%
Portland	4,077	185	88	73	0	346	8.49%
Westbrook	3,937	140	5	28	29	202	5.13%
RiverCOG Total	81,081	4,109	1,215	1,224	185	6,733	8.30%

CT Department of Housing, https://portal.ct.gov/DOH/DOH/Programs/Affordable-Housing-Appeals-Listing

COST BURDEN HOUSEHOLDS

Another measurement of housing affordability is housing cost as a percentage of household income. Traditionally, households spending more than 30% of their income on household expenses (including rent/mortgage, utilities, taxes, and maintenance) are considered to be cost burdened.[27] According to Department of Housing and Urban Development, if households exceed 30% expenditure on housing, they "may have difficulty affording necessities such as food, clothing, transportation, and medical care" as well as for retirement savings, education, and saving toward a down-payment.[28] Based on this standard, as of 2018, 51% of renters, 30% of homeowners with a mortgage, and 19% of homeowners without a mortgage in the region were cost burdened by their housing expenses.[29] A visual representation of this data can be seen in Figure 5-6.

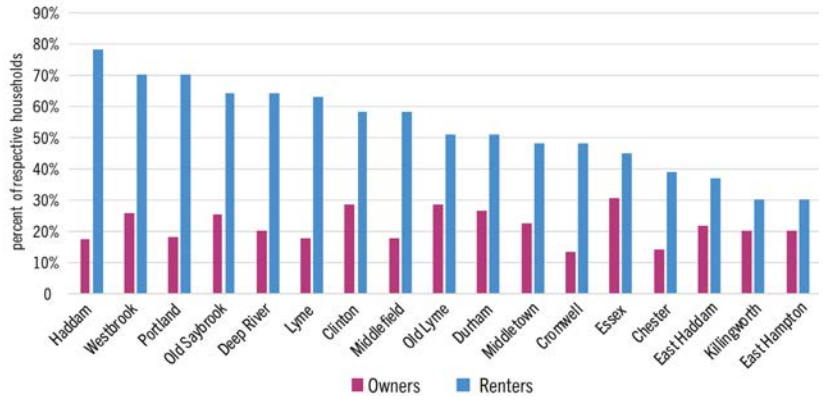
Cost burden does not impact all households equally. Amount of household income directly affects the range of housing costs and influences housing affordability. In higher income households, it is likely that the remaining 70% of income will be adequate to manage the cost of non-housing related necessities such as food, education, healthcare, and basic services. Therefore, while it is important to provide housing at all income levels, it is particularly important to examine the impacts of cost burden on lower income households.

Table 5-7 considers "cost burden" as a percentage of median household income (MHI) for the region for residents making 80% MHI, 50% MHI, and 30% MHI.

Due to the limitations of ACS data, a precise breakdown of household income to match percentage of MHI was not possible. However, the data still clearly shows a substantial number of households in the region making less than the MHI. It is important also to note that measurements of MHI only take into account people already living in the region, not those who should be able to live here. Looking at varying percentages of MHI captures the needs of a broader population.

Using 30% of household income to determine whether housing is affordable is a useful way to standardize measurement of affordability across all income levels and household types; however, it does not account for differences in circumstances. The cost-burdened measurement of housing affordability should be considered as a baseline, to be supplemented with additional information about the characteristics of a community. The basic question should be whether, after paying for housing related expenses, the remainder of a household's income is sufficient to cover other basic needs.

Figure 5-6. Housing Cost Burdened Households



Key Housing Data: ACS 2018; 5 - Year Estimates

Table 5-7. Percentage of Regional Median Household Income

Regional MHI	$91,941
80% MHI	$73,552
Households Making $50,000 – $99,999	20,055
50% MHI	$45,970
Households Making $25,000 - $49,999	11,316
30% MHI	$27,582
Households Making Less Than $25,000	9,403

Key Housing Data: ACS 2018; 5 - Year Estimates

CONSTRAINTS ON AFFORDABLE HOUSING

The creation of housing that is affordable (statutorily or otherwise) to all segments of the population is a multifaceted endeavor, and the barriers to creation of such housing are equally diverse. Affordable housing can be created through preservation and rehabilitation of existing housing stock, repurposing non-residential structures for residential uses, and construction of new housing units. This section will focus specifically on barriers to rehabilitation and construction of new units in the region.

Land Use Regulations and Predictability in the Approvals Process

Because municipalities do not, themselves, build new housing units, they are reliant on private developers to create the housing supply. Thus, in order to create a supply of affordable housing units, municipalities must incentivize developers to build them. Most developers are for-profit businesses that cannot undertake a development project unless it is profitable. Unfortunately, many of the zoning regulations in the region, make the development of affordable housing untenable by requiring the construction of predominately free-standing single-family housing on one or two acre lots.[30] [31]

Affordability can be improved by allowing a greater number of units to be built on a smaller parcel of land, and by streamlining the permitting process for a shorter and more predictable project approval by the municipality.[32] [33] In most LCRV municipalities, a developer seeking to build a new multi-unit project, or even a single-family project on a small lot, would be required to obtain a special permit and undergo additional project review. This adds time, expense, and uncertainty to the project, and provides little incentive for the developer to undertake it. The same can be said for non-profit developers who are often operating with limited financial resources and within narrow legal constraints.

Limits in the zoning regulations and uncertainty in the permitting process are not only detrimental to developers building new projects but can also deter individual homeowners seeking to create added density on their own properties. For example, building an accessory dwelling unit or converting a single-family home into multi-family units can create hidden density by adding units without altering the appearance or character of a community. However, such conversions are not easily permitted in much of the region.

Land Availability and Adequacy of Infrastructure

The region boasts an abundance of undeveloped land, but a significant portion of this land is not necessarily suitable or desirable for development. Much of the land is steeply sloped and part of ridges of bedrock, wetlands, flood plains, or important natural habitat with conservation value. Infill development adjacent to existing building and infrastructure is preferable, but opportunities for infill development can be scarce or expensive, or complicated, particularly when brownfield contamination is present.[34]

Placing new development on less suitable, but potentially less expensive, land further from existing municipal centers can result in expensive additions to infrastructure including roads, water, and sewer.[35] The cost of these extensions adds to the cost of housing and can induce sprawl development that degrades the natural environment.[36] The lack of sewer availability in the region can be problematic for infill development. In the region, density has largely been dependent upon soil capacity to support onsite septic disposal systems as much of the region is not serviced by sewer. Smaller lots with insufficient soil capacity cannot support traditional septic for a multi-unit development. This means developers may need to purchase larger lots for fewer units, adding expense, decreasing return, and perpetuating a sprawling development pattern.[37] Further, zoning and soils types are not necessarily coordinated, so an area that can accommodate large septic flow may not be in a zoning district that permits higher densities, and vice versa. Newer septic and community wastewater systems could be utilized more, but current state regulations and permitting processes may make utilizing such approaches difficult, if not impossible.

Identifying appropriate land with sufficient infrastructure, including sewer or soil capacity, to support higher densities, is an ongoing challenge in the region.

Development Costs

Since the mid-2000s, increasing labor and materials costs have become the largest component of rising housing construction costs across the US.[38] There are multiple reasons for this increase, including the facts that 1.5 million residential construction workers have left the industry since the 2008 recession and there are insufficient numbers of new workers ready to join the industry.[39] This latter issue can be attributed, in part, to decreasing opportunities for vocational education, a general shift in younger workers away from

traditional "blue-collar" and trades work, and the increase in construction trade activity in the Southern and Western United States.[40] Even in areas that have added more apprenticeship and vocational training, there is considerable lag time between adding these programs and adding significant numbers of skilled workers to the labor force.[41]

In addition, the cost of building materials has substantially increased over the last two decades. Lumber prices, in particular, jumped approximately 60% between December 2019 and July 2020 alone.[42] Framing lumber is about one fifth of the materials costs of building a home, therefore a substantial increase in lumber prices will have a notable negative effect on housing affordability.[43]

Financing

There are many financing options available to assist developers in keeping housing costs to consumers low while maintaining a profit margin.[44] Unfortunately, these financing options are complex, requiring professional knowledge to bring several options together and make a project financially feasible.[45] Not only do the funding sources and project requirements vary, but so do the expected reporting commitments and timelines, adding to the complexity and cost of a project. Further, even after piecing together these financing options, additional incentives are often needed to lessen the cost of the project, such as local land grants, reduced fees, expedited permitting processes, or tax abatements.[46] Currently, the region provides little assistance to developers attempting to navigate financing options for affordable housing and provides little in the way of additional incentives.

Community Opposition (NIMBY)

A strong stigma persists within the region regarding affordable housing and who will live in it. This often leads to strong community opposition to affordable housing projects and adds to the uncertainty of permit approval. While most of the region acknowledges the need to address affordable housing issues and diversify housing opportunities, affordable and diverse housing is often blocked from moving forward in the interest of maintaining community character. However, affordable housing is not in opposition to community character and can in fact, contribute to it. Public education and outreach can play a large role in countering negative public opinion and building public trust, but it is not regularly undertaken in the region.

5.5 HOMELESSNESS

The Point-in-Time Count (PIT) is a national homelessness data collection event that is required by Congress and HUD to be conducted annually. Community organizers and volunteers work with municipal governments and non-profit organizations to survey individuals living in shelters, in transitional housing programs, on the streets, in the woods, or in abandoned buildings. Data collected through the PIT informs future resource allocations for the upcoming year.

According to the 2020 PIT data collected by the Connecticut Coalition to End Homelessness, there were 107 homeless individuals in the City of Middletown.[47] Of that population, 69 were living in emergency shelters, 19 were living in transitional housing, and 19 were unsheltered. The majority of this homeless population consisted of adults. There were 85 adults, 73 living alone and 12 with children. A total of 22 homeless individuals were children under the age of 18. Minority groups made up a disproportionate share of this homeless population when compared to the regional population. Of those surveyed, 29% identified as Black and 20% identified as Hispanic. This is compared to approximately 5% and 6% of the region's population, respectively.[48] In addition, those with mental illness or intellectual impairment accounted for 16% of the homeless population.

The recorded homeless population for Middletown has remained consistent over the past several years, from a high of 132 in 2016 to a low of 93 in 2019, however, the percent of the homeless population who are unsheltered has declined dramatically in the past several years from a high of 39% in 2016 to a low of 15% in 2019.[49]

No PIT data was reported for other towns in the region; therefore, this data likely underestimates the region's total homeless population.

Ferry Crossing Housing Development, Old Saybrook

Source:Oldsaybrookchamber.com

KEY TAKEAWAYS

- *A vast majority of homes in the region are detached single family units; more than twice the other housing types combined.*
- *Middletown provides the greatest portion of the region's housing, roughly 25%, as well as the greatest variety of housing types.*
- *The average household size for homeowners in the region is 2.48 persons and the average household size for renters is 2.09 persons.*
- *The ratio of homeowners to renters in the region is about 3:1.*
- *51% of renters are considered cost-burdened in the region*
- *The region as a whole does not meet the CGS Section 8-30g requirements for affordable housing and the only municipality above the 10% threshold is Middletown, supplying 70% for the region.*
- *Despite having only one-quarter of the region's housing stock, Middletown supplies a disproportionate share - more than half - of the region's rental housing.*

ENDNOTES

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2 US Census Bureau (2018). 2014-2018 American Community Survey 5-year estimates

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6. TRANSPORTATION

6.1 INTRODUCTION

The transportation network of the Lower Connecticut River Valley region has been shaped by the region's history, technology, topography, and settlement patterns. Today, the primary mode of transportation in the region is the single occupancy vehicle. However, a balanced, multi-modal transportation network can increase mobility, equity, and access to the region. This section will provide an overview of the region's existing transportation networks. A further discussion of regional transportation infrastructure and trends can be found in the regional Metropolitan Transportation Plan (MTP) (2019 – 2045) which serves as the primary data source for this section.

6.2. REGIONAL TRANSPORTATION INFRASTRUCTURE

ROADS AND HIGHWAYS

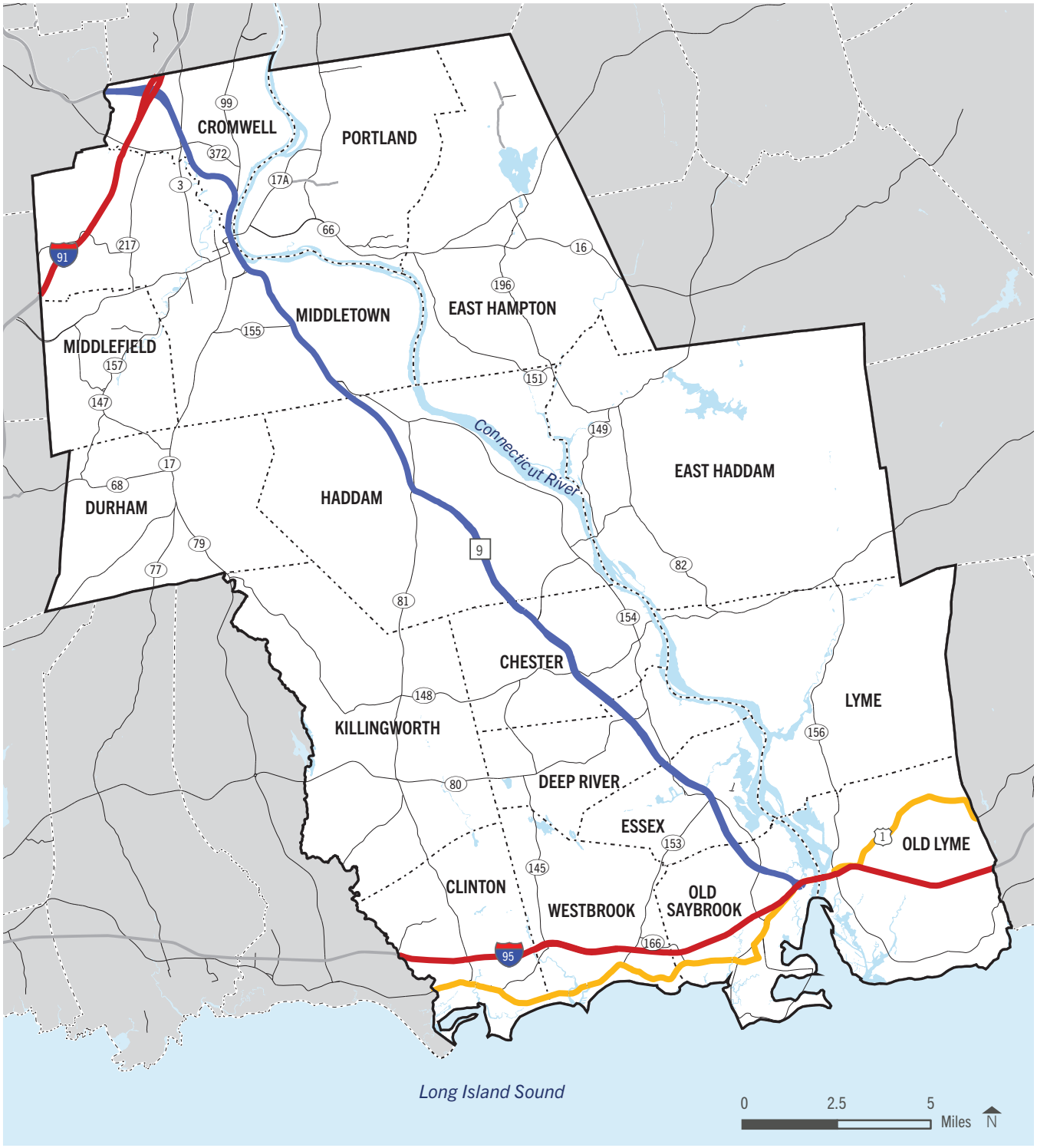
The region is generally served by three major roadways: I-95, which runs along the shoreline providing access from east to west, Rte. 9, which transects the region from north to south, and I-91, which crosses the far western portion of the region, connecting to New Haven, Hartford, and Springfield, MA. In addition, Rte. 66, connects Middletown to Meriden and Waterbury in the west and Portland and East Hampton to the east, and U.S. Rte. 1 (Boston Post Road) serves as a main road along the shoreline. The regional roadway network is shown in Figure 6-1.

The topographic characteristics of the region led to development occurring initially in a north-south direction along the Connecticut River. There are three major river crossings: I-95 in the south, the Haddam-East Haddam Swing Bridge at the region's center, and the Arrigoni Bridge in the north. In addition, the Chester-Hadlyme Ferry and Plum Island Ferry in Old Saybrook provide additional crossings during the summer months.

Chester-Hadlyme Ferry

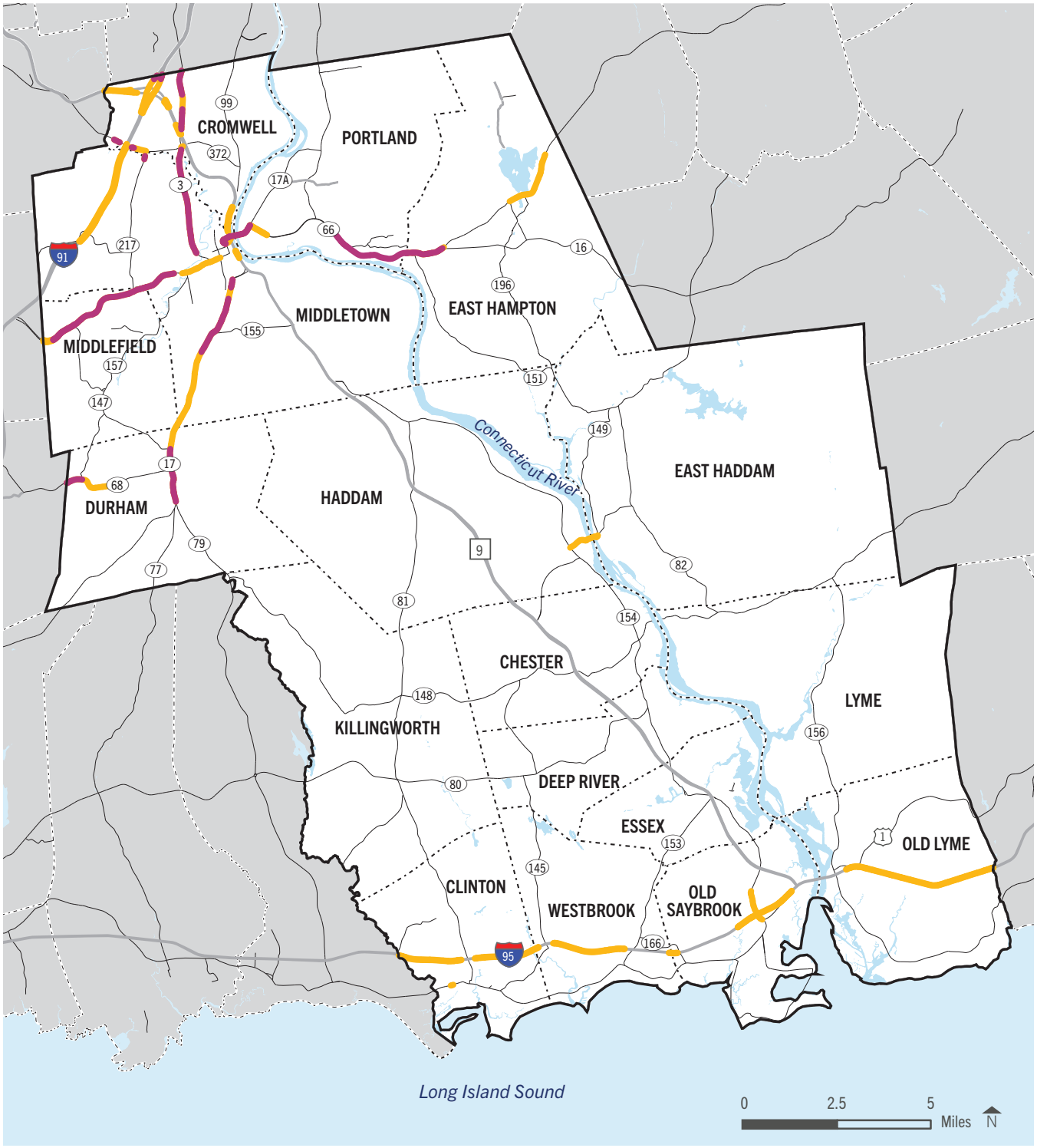
Source: RiverCOG

Figure 6-1. Regional Roadway Network



Source: CT Department of Transportatiion

Figure 6-2. Roadway Capacity



Over Capacity Roadways

- Over Capacity in 2011
- Over Capacity in 2035
- Major Road

Source: CT Department of Transportation

Roadway Congestion

Capacity analysis is a tool that helps identify roads that are congested or will become congested if current trends continue without roadway improvements. According to CTDOT, the region had several segments of highways that were near or exceeding their capacity in 2011. By 2035 it projected that many more highway segments would be near or over capacity. As shown in Figure 6-2, roadways of concern include I-95 and I-91, as well as Rtes. 3, 17, and 66.

Roads that are at or approaching capacity are also the roads with the highest Average Daily Traffic (ADT). Average Daily Traffic (ADT) on state routes is shown in Figure 6-3. Roads with the highest ADT include I-91 and I-95. Rte. 9 has the third highest traffic volume in the region, but typically congestion occurs only at the signals in Middletown and ramps in Cromwell.

With the exception of I-95 during an accident or summer weekend, few areas of the region's road network can be considered truly congested. During the summer tourist season, the ADT on Rte. 1 and other major connectors near the shoreline increase significantly.

Traffic on Route 9 in Middletown

Source: Courant.com

BUS ROUTES

There are two transit districts that provide local public bus service in the region: Middletown Transit District (MTD) and Estuary Transit District (ETD). Figure 6-4 shows the public bus routes in the region for both MTD and ETD. Connecticut Transit (CT Transit) connects the region to Hartford and beyond.

Middletown Transit District

Middletown Transit District (MTD), as Middletown Area Transit (MAT), operates five regularly scheduled loop bus routes (Routes 581-585) in the city of Middletown and Cromwell, as well as a bus terminal in downtown Middletown. These loop routes are designed to increase efficiency and coverage area and the headway is one hour . These buses rarely run at full capacity making it difficult to justify additional service for shorter headways.

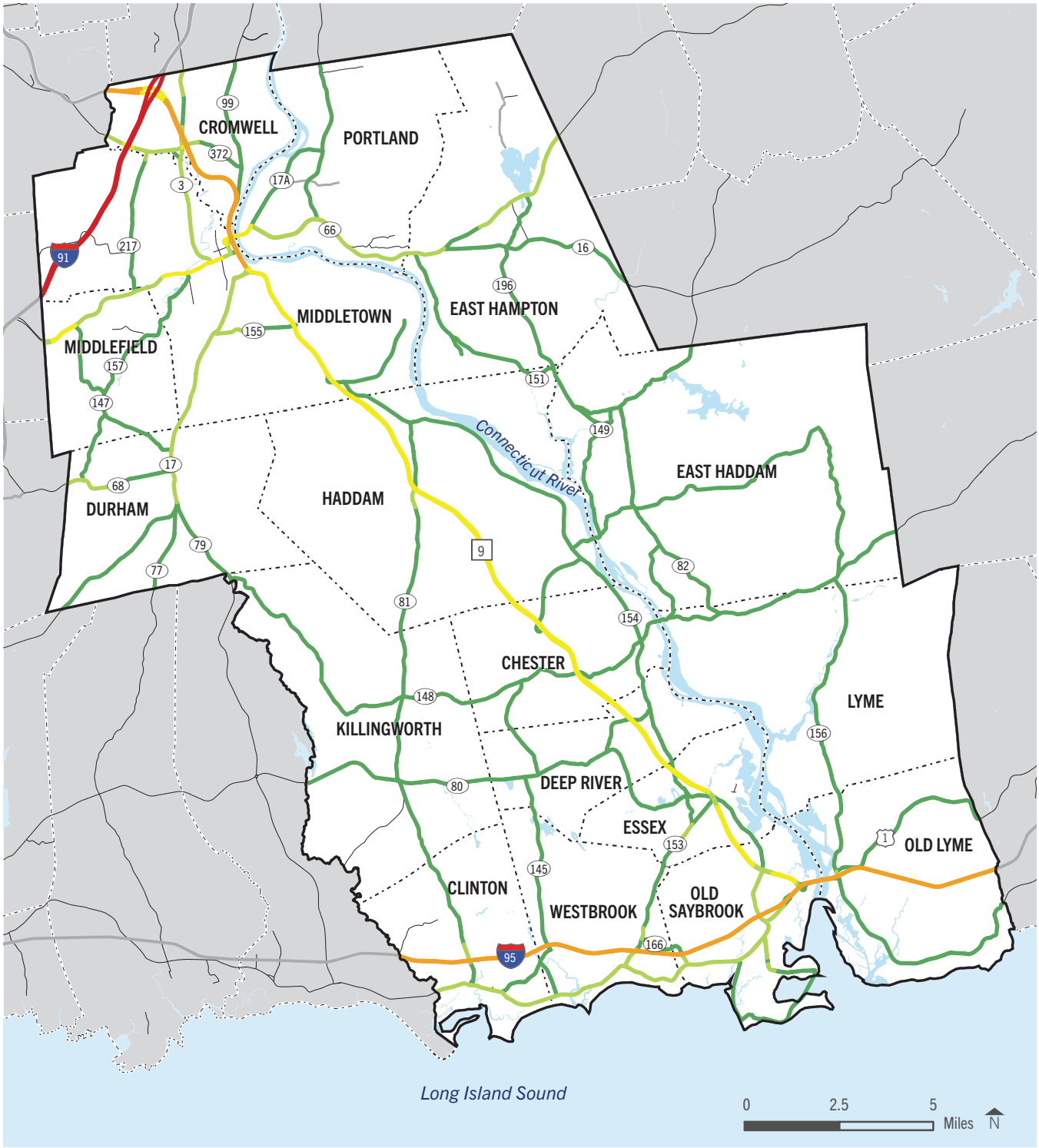
MAT also operates two linear out-and-back routes: Route 590 (formerly M-Link) that connects Middletown with Meriden, and Route 586 that serves residents in the towns of Portland and East Hampton. Route 590 operates with a 40-minute headway designed to make it easier for riders to make the trains at the Meriden Amtrak Station. Route 586 is a long, linear out-and-back route that has overall low ridership and operates with a two-hour headway.

From 7:00 p.m to 11:00 p.m., MAT operates two nightly loop routes with a one-hour headway (Route 581-583 and Route 584-585). These are a consolidation of the daytime routes. On Saturdays, MAT operates five routes that offer the same geographic coverage as the weekday routes. These are Route 581 Expanded, Route 582-583, Route 584-585, Route 586, and Route 590.

MAT provides paratransit services for eligible persons with disabilities in accordance with the Americans with Disabilities Act (ADA) of 1990). Service area is identical to the fixed route bus system providing trips within three quarters of a mile of a fixed bus route and operates Monday through Saturday.

Dial-A-Ride service is also provided for persons over sixty years of age in Durham, East Hampton, Middlefield, Middletown, and Portland beyond three quarters of a mile of the fixed routes. Appointments must be made one day in advance and the fare is $3.50. In order to qualify for either of these services, one must first fill out an application and be accepted into the system after eligibility requirements are satisfied.

Figure 6-3. Average Daily Traffic



Average Daily Traffic Counts, 2015

- 0 - 10,000
- 10,001 - 25,000
- 25,001 - 50,000
- 50,001 - 100,000
- 100,001 - 200,000

Source: CT Department of Transportation

Estuary Transit District

Estuary Transit District (ETD) operates five bus routes as 9 Town Transit (9TT) in Clinton, Westbrook, Old Saybrook, Essex, Deep River, Chester, Haddam, Killingworth, Middletown, Madison, Old Lyme and New London. These routes operate as flex route services deviating up to three quarters of a mile off the primary route. Beyond established bus stops, potential riders may flag down a bus at any point along the route where it is safe for the bus to stop. All 9TT routes are long, linear out-and-back routes. Route 641 operates with hourly headways. Other routes operate with two-hour headways.

9TT provides ADA paratransit services that complement Route 641. ADA Paratransit is a service for people who are unable to use a fixed route bus for certain trips. For trips to or from destinations not within the ADA service area for Route 641 or for trips not within a deviated fixed route service area for persons who have difficulty using the deviated fixed route because of a disability, 9TT also operates door-to-door Dial-A-Ride service. With one day advance reservation, Dial-A-Ride provides transportation from the door of your pick-up location to the door of your destination anywhere within the towns of Chester, Clinton, Deep River, Durham, Essex, East Haddam, Haddam, Killingworth, Lyme, Old Lyme, Old Saybrook and Westbrook.

In 2019, 9TT started its XtraMile on demand transit service in Old Saybrook and parts of Westbrook and Essex. XtraMile allows passengers to request a ride anywhere in the service area during service hours. The service is powered by a smartphone app that locates the passenger's pickup point and gives estimated times for pickup and drop-off. XtraMile's flexibility allows for convenient connections to Shore Line East and Amtrak train services at Old Saybrook and Westbrook Stations. ETD also operates a seasonal trolley in Clinton connecting the town center, beaches, train station, and Clinton Crossing outlet mall.

CT Transit

Connecticut Transit's Hartford Division operates one local bus route (55) Monday through Saturday and two commuter express bus routes (906 and 921) only on weekdays. Route 55 runs between Hartford and Middletown via the Silas Deane Highway with stops in Wethersfield, Rocky Hill and Cromwell. Route 906 runs between Hartford and Cromwell, and Route 921 between Hartford and Old Saybrook via RT 9 and I-91. Free transfers are available between CT Transit routes, MTD, and 9TT routes.

Major limitations of the existing transit service throughout the region are the lack of Sunday service, long headways, infrequent service on routes, and limited evening hours. These limitations impede transit use for those who would otherwise use it to commute to work but who keep non-traditional working hours, thus reinforcing car-dependency in the region.

RAIL

Amtrak, CTDOT, Tilcon, and CTDEEP all own rail lines in the region on which passenger, tourist, and freight services are provided. Figure 6-5 shows all rail lines and stations within the LCRV region.

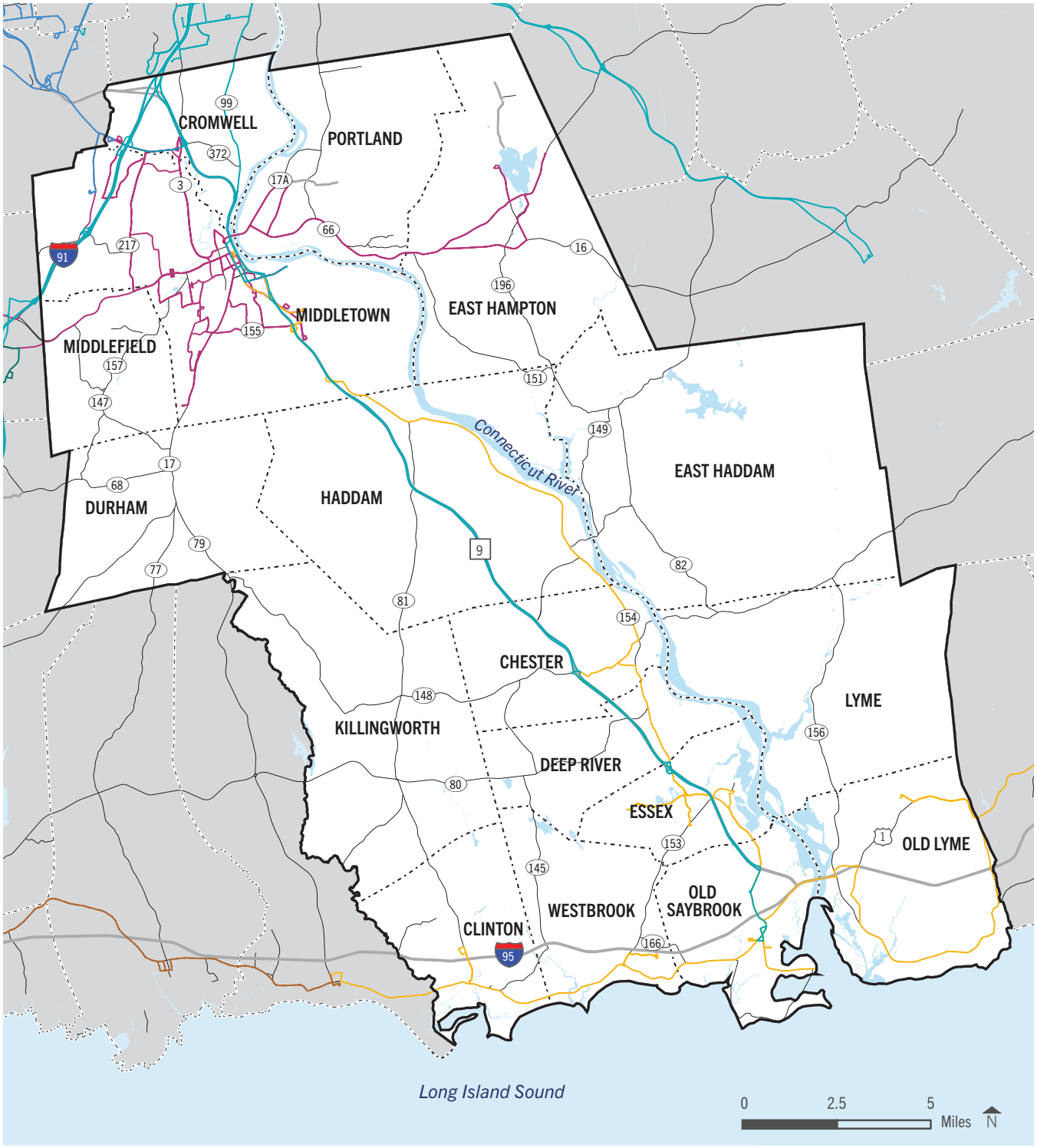
Passenger/ Commuter Rail

Shoreline East (SLE), a commuter rail service of CTDOT, provides service between New Haven, Old Saybrook, and New London. SLE serves the rail stations in Clinton, Westbrook, and Old Saybrook within the region. A majority of trains travel between New Haven and Old Saybrook due to limitations created by moveable bridges east of Old Saybrook. In New Haven SLE connects to Metro North rail service to southwest Connecticut and New York City and CTRail commuter service to Hartford and Springfield, MA. According to the MTP, SLE service is expected to double between New Haven and Old Saybrook by 2030.

Amtrak/Shoreline East Station, Old Saybrook

Source: Shorelineeast.com

Figure 6-4. Public Bus Routes



Bus Routes

- MAT Routes
- Estuary Transit
- Hartford Routes
- New Britain Routes
- New Haven Routes

Source: CT Department of Transportation

Amtrak, the national passenger railroad company, connects the region to the rest of the northeast corridor, providing service to Boston, MA, New York, NY, and Washington, DC from Old Saybrook Station. Old Saybrook is the midpoint between Boston South Station and New York Penn Station with travel times of approximately 2 hours and 15 minutes on an average weekday. Average weekday service between Old Saybrook and Washington DC (Union Station) is approximately 6 hours and 7 minutes.

Tourist Train

The Valley Railroad extends from Old Saybrook to a connection with the Laurel Track in southern Middletown. Currently, the Essex Steam Train, a tourist train passenger service, runs historic locomotives and coaches along portions of this line. According to the Valley Railroad Company, approximately 140,000 passengers ride the Essex Steam Train per year. Between Haddam and Middletown, the rail line is out of service. The line is owned by CTDEEP and was purchased with federal conservation funds for public recreation use. The 2014 Valley Railroad State Park Scenic Corridor Study provides conceptual designs and design guidelines for the development of a multi-use trail along the corridor. The Valley Railroad Company does not currently carry freight along the line, but retains the right to do so in its lease with CTDEEP.

Freight

Within the region, freight is transported primarily by truck, but a small portion of heavy material is transported by rail. The primary operator of freight rail in the region is the Providence and Worcester Railroad (P&W), which is owned by Genesee & Wyoming (G&W). P&W run freight service along the shoreline with options for up to six daily trips or as allowed through CTDEEP permits.

The Middletown Rail Cluster consists of four lines originating from the City of Middletown, which are owned by the State of Connecticut. There is no passenger or through freight service on these lines, only freight service provided by G&W. The Middletown Rail Cluster is comprised of the following lines:

- **The Portland Line:** Travels 1 mile east from Middletown across the Connecticut River into Portland.
- **The East Berlin Line:** Travels 1.1 miles northwest from the Middletown diamond, a superimposed pair of crossovers, resembling the letter "X", towards Berlin.
- **The Middletown Secondary Line:** Travels 7.3 miles southwest from the Middletown diamond through Middletown, Middlefield, and Durham to Reeds Gap. From Reeds Gap to North Haven. The line is owned by Tilcon and operated by the G&W Railroad. This is line is a remnant of the historic Airline Railroad corridor.
- **The Laurel Track:** Travel 5.5 miles southeast from Middletown towards Haddam and connects to the CTDEEP owned Valley Rail Line. The Laurel Track is currently out of service.

In addition, the Wethersfield Secondary Line traverses 16.6 miles north from the Middletown Cluster to the Hartford interchange. P&W/G&W provides weekly through freight service between Middletown and Hartford on this line.

Connecticut Valley Railroad, Essex

Source: Middletown Press

Figure 6-5. Rail Lines

Rail Network

- MAT Bus Station
- Amtrak and Shoreline East
- Shoreline East
- Valley Railroad Stop
- Amtrak and Shoreline East
- Valley Railroad - Active
- Valley Railroad - Inactive
- Middletown Rail Cluster Network
- Wethersfield Secondary Line

Source: CT Department of Transportation, CT Department of Energy and Environmental Protection, RiverCOG

BICYCLE AND PEDESTRIAN INFRASTRUCTURE

Bicycle Routes

The Connecticut Active Transportation Plan contains a Statewide Bicycle Planning Network. This network identifies key routes and connections which bicyclists can use to travel throughout the state. It also provides guidance to CTDOT on where future improvements should occur and with what level of priority. Figure 6-6 shows the proposed bicycle network and the three priority implementation tiers: Tier I segments have bicycle safety concerns and may be considered for stand-alone bicycle improvements; Tier II segments are less critical but may have bicycle improvements incorporated into existing maintenance and other road work; and Tier III segments generally meet recommended design criteria and are not identified as a key department priority, but should be maintained.. A list of Tier I and Tier II improvements in the region are provided below.

Tier I Improvements:

- Along Rte. 1 in Old Saybrook and Clinton
- A portion of Rte. 154 in Old Saybrook

Tier II Improvements:

- Along Rte. 1 in Clinton, Westbrook, Old Saybrook, and Old Lyme, without connecting across the Baldwin Bridge
- Along Rte. 156 through Lyme into Old Lyme
- Along Rte. 154 from Essex to Middletown
- A portion of Rte. 99 in Cromwell
- Along Rte. 66 in Middletown
- Along Rte. 3 in Middletown
- Along Rte. 17 in Middletown and Durham
- Along Rte. 149 in East Haddam, connecting to Haddam across the East Haddam Swing Bridge
- Along Rte. 17 A in Portland, connecting to Middletown across the Arrigoni Bridge

The identified bicycle infrastructure segments connect the region's municipalities along major roadways. Because of the large distances between municipalities and the general character of the roads identified, this network would likely be used for recreational purposes, rather than for daily commuting or access to goods and services. In addition, because the Active Transportation Plan focuses on state roads, it does not consider local bicycle networks that might facilitate in-town bicycle trips.

Through the passage of Public Act 09-154, Connecticut has recently endorsed a Complete Streets initiative aimed at providing enhanced bicycle and pedestrian infrastructure. Similarly, most municipalities in the region have endorsed Complete Streets objectives, which focus on providing safe access for all road users through integrated, connected, multi-modal transportation options.

The MTP emphasizes support of bike-friendly shared roadways, bike lanes, wide shoulder lanes, shoulder bikeways, signed bicycle routes, off road multi-use trails, and greenway corridors for bicycle and pedestrian use as a priority for recreational, personal business, and commuting purposes. Benefits from such projects include reduced roadway congestion, environmental benefits, and user health benefits.

Pedestrian Paths

Municipalities in the region have a sparse and discontinuous network of paved walkways and sidewalks. These walkways are focused around town centers and connect the centers with residential areas, services, school, and recreational facilities. Middletown possesses a dense and well-integrated sidewalk network in the downtown, North End, and Wesleyan campus but outside of these areas pedestrian infrastructure is very limited. In addition, because the existence and formality of walkways is usually a function of greater development density, some of the more rural municipalities have little to no pedestrian infrastructure. Lyme and Killingworth, for example, have no sidewalks within their boundaries. Also notably lacking are sidewalks along major arterials such as the Boston Post Road (Route 1), Middlesex Turnpike (Route 154), and Routes 66, 80, 81, and 82. Past CTDOT policies have limited sidewalk construction along state highways and have left noticeable gaps in the pedestrian network where sidewalks would be merited. However, the deficiencies in the pedestrian infrastructure are not limited to areas adjacent to state roadways.

Currently, sidewalk inventory is maintained by individual municipalities; there is not a consolidated inventory of pedestrian facilities for the region. Middletown, Westbrook, and Durham have sidewalk plans. Clinton is in the process of surveying their sidewalk network. To date, only Essex, Middletown and Old Saybrook have completed a bike/ped plan. RiverCOG has undertaken to create a regional pedestrian infrastructure inventory and assess existing facilities for pedestrian access and safety. Special focus will be placed on highly traveled commercial areas on State highways such as Rte. 1, Rte. 17, Rte. 66 and Rte. 154.

Figure 6-6. Proposed Bicycle Network

Priority Implementation Tiers

- Tier I Improvements
- Tier II Improvements
- Tier III Improvements

Source: Connecticut Active Transportation Plan (2017), CT Department of Transportation

Regional Trails

The region hosts a system of trails, many of which are in state parks and forests, town-owned lands, and land trust properties as well as extensive mountain biking trails. Two important multi-use trails in the region are in Middletown and include the Westlake Area Bikeway and the Mattabesset Trolley Trail. The Westlake Trail is 3.9 miles long and located in a residential/commercial area that links the FedEx building, a major regional employer, to a densely populated residential area. The Mattabesett Trolley Trail was recently extended in 2014 and now spans 3.9 miles in length. It loops around a residential area and provides scenic views and access to the Mattabesett River. Additional trails in the region include:

- **Air Line State Park Trail:** Beginning in East Hampton, the gravel trail for pedestrians, cyclists, and equestrians starts at Alden's Crossing and traverses about 4.7 miles before crossing into Colchester at Bull Hill Rd. Portland is currently working to extend the Air Line Trail to the Connecticut River and the Brownstone Exploration & Discovery Park. RiverCOG, Jonah Center for Earth and Art, and East Hampton, Portland, Middletown, Meriden, and Cheshire are working on a connection between the Air Line Trail in East Hampton and Portland to the Farmington Canal Trail in Cheshire. This connection would allow for the creation of a 112 miles loop trail connecting central Connecticut with the East Coast Greenway. In addition, East Hampton is working to close the gap between East Hampton's section of Air Line Trail and Portland.
- **New England Trail:** This hiking trail follows the ridgeline contours through Middletown, Middlefield, Durham, and Haddam and includes the former Metacomet and Mattabesett Trails in Connecticut and the Metacomet Monadnock Trail in Massachusetts. The New England Trail is over 200 miles long encompassing ridges, forests, and state, municipal, and private lands in 39 communities spanning central Connecticut, western Massachusetts, and southern New Hampshire. These trails are primarily designed for hiking and are designated as nonmotorized trails.

Airline State Park Trail, East Hampton and Portland

Regional Greenways

A greenway is a linear open space established at different scales along a natural corridor such as a river, forest, stream, ridgeline, rail-trail, canal, or other route for conservation, recreation, or multimodal transportation purposes. Greenways in the region include the Menunketesuck—Cockaponset Regional Greenway and the Quinimay Trail, Eight Mile River Greenway, Old Lyme Greenway, and the Connecticut River Gateway Conservation Zone Greenway. Clinton is working on an eastern extension of the Shore Line Greenway from its current terminus at Hammonasset Beach State Park to the center of town.

WATERWAYS

Connecticut River

Boating on the Connecticut River is an important driver of the region's tourism economy. A 2010 study conducted by RiverCOG analyzed the marina and boating traffic in the lower Connecticut River. The study reported a total of 32 boating facilities on the Connecticut River that provide slips for recreational and commercial boating. Within those 32 facilities, there are approximately 2,855 slips and 810 moorings in place, both private and public. Approximately 791 of those moorings were occupied for an occupancy rate of approximately 98%.

In addition to the number of slips available at boating facilities in the lower Connecticut River, there are approximately 251 private residential docks that are at full capacity. There are also 12 limited access inlets and coves that are accessible to small craft and/or kayaks and canoes, and at least 2 boathouse that are home to college and club, crew racing teams.

There are three commercial recreational river tour vessels and several charter companies offering sightseeing tours:

- The Becky Thatcher: The Valley Railroad's 70-foot riverboat offers a round-trip cruise from Deep River Landing to the Goodspeed Opera House and Swing Bridge in East Haddam. The riverboat is also available for charters.
- Lady Katherine Cruises: The 113-foot Mystique and Lady Katherine operate from Harbor Park Landing in Middletown and Charter Oak Landing in Hartford. They operate brunch and lunch cruises, entertainment cruises, fall foliage cruises, and holiday cruises among others. The ships are also available for private charters.
- The River Quest: A 64-foot vessel operated by Connecticut River Expeditions out of Eagle Landing State Park in Haddam, and the CT River Museum in the off-season. The River Quest is available for daytime, evening, and private educational and scenic excursions.

Barge traffic on the Connecticut River has significantly decreased in recent years and consists primarily of black oil and petroleum distillates, although most of these products are now shipped by pipeline. The petroleum products are transported to the Kleen Energy plant in Middletown and fuel terminals in Portland and Wethersfield. During the summer months, asphalt is occasionally transported by barge to Portland.

The U.S. Coast Guard Cutter Bollard, docked in New Haven, has operated throughout the Connecticut River, Long Island Sound, and Narragansett Bay since it was commissioned in 1967. The unit provides aids to navigation, conducts domestic ice, search and rescue, law enforcement, and homeland security operations. The 65-foot Bollard conducts the majority of its ice breaking on the Connecticut River, where it escorts fuel barges through the river to the Middletown power plant and beyond.

Shoreline

The region's four shoreline municipalities have significant boating use and infrastructures on Long Island Sound. There are nine marinas in Westbrook hosting 1,327 slips within the lower mouth of the Patchogue River. Clinton has eight marinas hosting 908 slips and a charter cruise sailing vessel. Old Lyme has a marina at Point of Woods hosting 75 slips for small boats. Several of the marinas also offer boat rentals.

TRANSPORTATION FUNDING SOURCES

The following are common federal funding programs used by the municipalities to support transportation infrastructure projects in the region:

- Surface Transportation Block Grant (STP): Provides flexible funding for projects to preserve or improve conditions and performance on any Federal-aid public roadways.
- Transportation Alternatives (TA) Program: Primarily intended for bicycle and pedestrian projects.
- Congestion Mitigation and Air Quality (CMAQ) Program: Provides flexible funding for transportation projects and programs to help meet the requirements of the Clean Air Act and reduce congestion and improve air quality.
- Local Bridge (LB) Program: Provides funding to replace, remove, or reconstruct existing bridges that are structurally inadequate or functionally obsolete.
- Ferry Boat (FB) Program: Provides funding for the construction of ferry boats and ferry terminal facilities.
- Eastern Federal Lands Access (EFLAP) Program: Used to improve transportation facilities that provide access to, are adjacent to, or are located within Federal lands.
- Better Utilizing Investments to Leverage Development (BUILD) Discretionary Grant Program: Used for transportation projects encompassing safety, economic competitiveness, quality of life, state of good repair, environmental sustainability, innovation, and partnerships with a broad range of stakeholders.

Marina in Haddam

Source: RiverCOG

In addition, the following state funding programs are also available:

- The Local Transportation Capital Improvement Program (LOTCIP): Intended for municipal capital improvement projects such as pavement rehabilitation, reconstruction, and sidewalks.
- Community Connectivity (CC) Program: Intended for Road Safety Audits of priority pedestrian and bicycle corridors and intersections, as well as funding for capital improvements that improve bicycle and pedestrian safety.
- Town Aid Road (TAR) Program: Towns may use these grants for various public works purposes as specified in CGS 13a Chapter 240 Section 13a-175a.

For transit specific projects, the following state and federal funding is available:

- FTA 5310: Designed to enhance the mobility of seniors and persons with disabilities beyond the services provided by traditional public transit.
- Municipal Grant (MG) Program: State Matching Grant Program for demand responsive transportation for elderly and people with disabilities Available to municipalities based on a formula set out in the Connecticut General Statutes.

This list is not exhaustive, but rather is representative of the breadth of funding sources available to municipalities for transportation related projects.

THE METROPOLITAN TRANSPORTATION PLAN

The Metropolitan Transportation Plan (MTP) defines the region's future transportation vision and outlines regional transportation funding priorities. The plan identifies how the metropolitan area will manage and operate a multi-modal transportation system including transit, highway, bicycle, pedestrian, and accessible transportation to meet the region's economic, transportation, development and sustainability goals. The plan includes long-range and short-range strategies based on a minimum twenty-year planning horizon and is updated every four years. The last MTP was adopted March 2019.

Key Findings of the MTP

Car ownership is necessary in much of the region: relatively dispersed development patterns in the region have fostered a near universal dependency on the automobile. This development pattern adversely affects lower income residents since they are less likely to own a car. The MPT

MTP RECOMMENDATIONS

The following provides a summary of the recommendations from the MTP that are relevant to regional land use policy. Because the MTP identifies transportation priorities for the region, these recommendations provide a strong indication of where residents and stakeholder can expect investments to occur over the next 20 years:

- *Better connect the region and employment hubs to the north;*
- *Improve frequency of service on existing transit routes to enhance inter-connection between other transit modes and village service centers;*
- *Provide express bus service from Middletown to CTfastrack in New Britain;*
- *Optimize and improve transit connections between the two transit districts, town centers, commuter lots and CT Transit express services and rail stations;*
- *Obtain funding and assistance for Complete Streets planning for sidewalk planning and construction, with the regional goal of linking dense population clusters within the towns;*
- *Prioritize commuter bike facilities for funding and promote programs for advocating support by regional businesses;*
- *Integrate bicycle and pedestrian facilities with other transportation modes, particularly transit;*
- *Encourage bicycle links between neighborhoods, employment centers, schools, parks and other destinations;*
- *Provide zoning and subdivision templates for towns to promote regional and local complete streets policy;*
- *Develop model zoning and subdivision regulations for complete streets that accommodate multiple transportation modes for potential town adoption;*
- *Implement transportation demand management (TDM) strategies;*
- *Make public transportation capital and operational improvements; and*
- *Encourage non-motorized modes of transportation.*

notes that, "lower income households are more likely to be dependent on public transportation than personal vehicles."

Priority is shifting to providing multi-modal transit networks: There is a shifting focus from the singular goal of moving automobile traffic to a more comprehensive focus on overall mobility and community livability. Concepts such as complete streets, transit-oriented development, traffic calming, and "share the road" are being implemented to improve the economic vitality of town or neighborhoods while accommodating all modes of transportation.

New transportation solutions are needed to meet younger demographics needs: Younger residents have shown less interest in automobile ownership and have a greater preference for denser, less car-based communities focused around mass transit. The current challenge for the region is to proactively invest in more complete transportation networks and implementing land use policies that are less automobile centric.

As population ages there will be a need to improve services to meet increasing demand: An estimated 33,057 individuals om the region are over 65 years of age, which represents nearly 6% of the total population. The elderly population is expected to increase by more than 8,000 individuals by 2040. The aging population will have different transportation needs, including an increased need for para-transit services and more walkable neighborhoods.

Roads are not congested but may become more so: A majority of the region's major roads are congestion free much of the year, barring accidents or road work. During the summer tourist season, the ADT on Rte. 1 and other major connectors near the shoreline increases significantly leading to congestion in those areas. CTDOT projects that the number of roadways in the region that are over capacity will increase from 5% in 2011 to 14% in 2035 if current growth patterns continue without improvements to roadways or a change in land-use policies.

Lack of regionally coordinated land use negatively impacts residents: While land use commissions have implemented planned programs in their individual towns, land use trends in the region have been predicated on parcel-by-parcel decisions within each of the towns. This results in an unplanned and scattered approach to regional transportation improvements with the following consequences:

- Lack of access for transit riders, pedestrians and bicyclists.
- Further fragmentation of natural resource corridors.
- Increase of traffic congestion on the region's collector routes.
- Demands for costly improvements to developed commercial areas for transit access, sidewalks, bikeways and other amenities.
- Lack of inter-parcel access, especially in "strip" commercial zones which creates additional trip generation on highways.

6.3 COMMUTER TRIP ANALYSIS

The patterns of development in the region influence the preferred modes of transportation. Due to the pattern of low-density suburban development in the region, there has been significant emphasis on highway travel and single occupancy vehicle trips. However, high levels of single occupancy vehicle trips contribute to higher carbon emissions, increased commute times, and larger amounts of land dedicated to road infrastructure and parking. In addition, the focus on single occupancy vehicles creates a strong disadvantage for residents in the region who do not have access to a car.

It is important to understand the patterns of travel in the region in order to diversify mode choice for residents. Because workday commutes are essential travel for most residents, this section will analyze commuter trips in order to assess where transportation infrastructure should be diversified.

COMMUTING PATTERNS

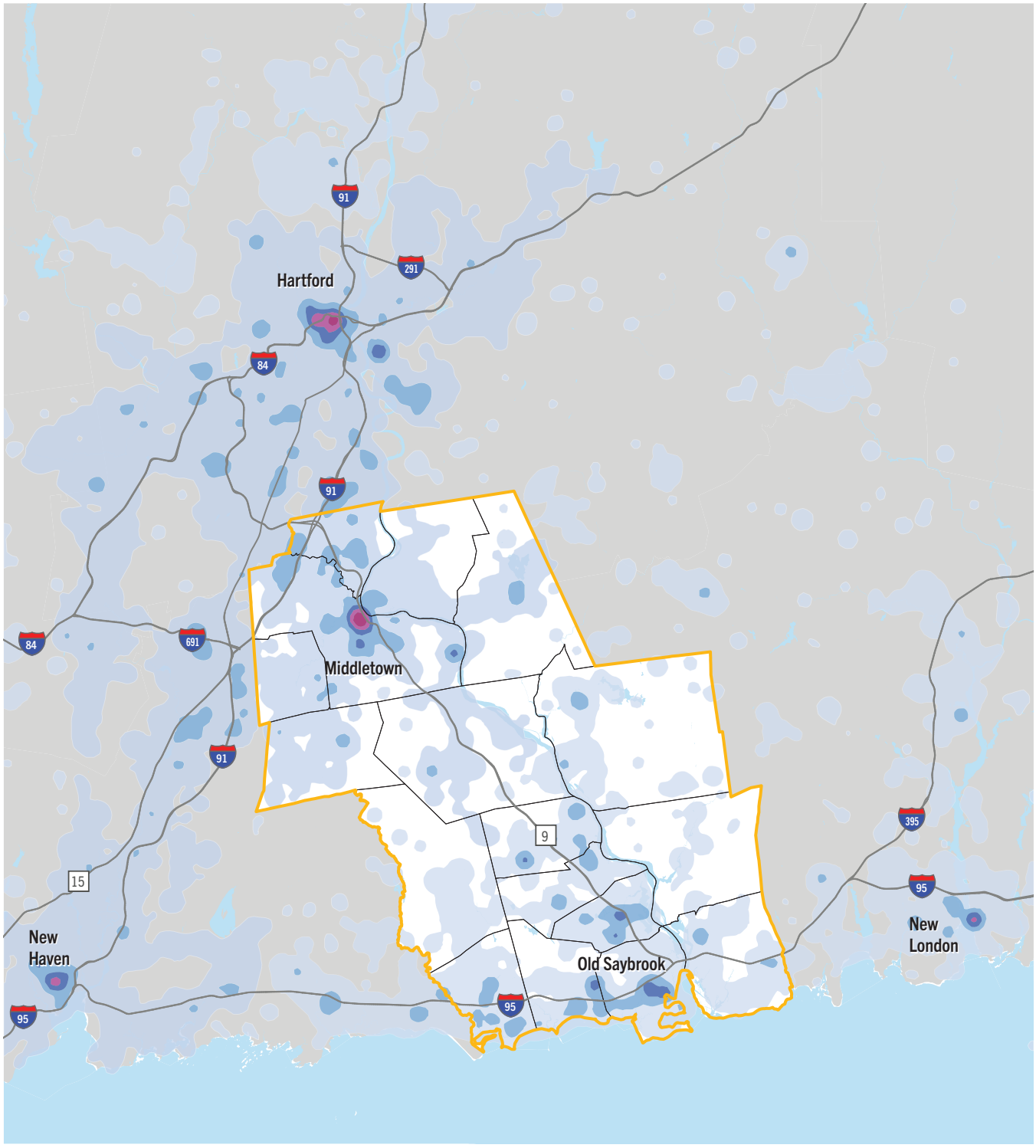
The majority of the region's working age population (68%) commute outside of the region for work at their primary job.[1] However, most of these residents (78%) travel less than 24 miles in their work commute.[2] Figure 6-7 identifies the primary commuter destinations as Middletown, Hartford, and New Haven.

Middletown is the work destination for roughly 8,800 (11%) of the region's working population.[3] This is followed closely by Hartford, where over 6,900 (8.5%) of the region's residents work. New Haven, Meriden, East Hartford, Newington, New Britain, Old Saybrook, West Hartford, and North Haven are commuting destinations for roughly 1,000 to 2,700 residents each.[4]

Residents of Middletown hold nearly 6,600 (10%) of the jobs in the region.[5] Other commuters into the region travel from Meriden, New Britain, Hartford, Portland, Bristol, New Haven, East Hartford, West Hartford, and Newington.

In the northern portion of the region, Middletown is connected to Hartford through CT Transit Route 55 and CT Transit Express Route 921 which provides direct access in approximately 1 hour (Route 55) or 45 minutes (Route 921). Route 921 continues to Old Saybrook, running in one

Figure 6-7. Primary Commuter Destinations



Source: .S. Census Bureau. 2020. LEHD Origin-Destination Employment Statistics (2002-2018). Washington, DC: U.S. Census Bureau, Longitudinal-Employer Household Dynamics Program, accessed on 2/16/2021 at https://onthemap.ces.census.gov

direction from Old Saybrook to Hartford in the morning and from Hartford to Old Saybrook in the afternoon. MTD's five regularly scheduled bus routes (Routes 581-585) loop through Middletown and Cromwell with a one-hour headway. These routes do not connect well to CT Transit Routes 55 or 921 to facilitate convenient access to job centers outside the region. MTD Route 590, which operates with a 40-minute headway, provides connection to the Meriden Amtrack Station, which does allow greater regional access. However, MTD only operates limited evening and Saturday service and no service on Sundays. Because driving takes a fraction of the time and is not restricted on evenings and weekends, the current transit service level would not serve as a satisfactory alternative to private vehicle use.

In the southern portion of the region, ETD operates five routes that extend to Middletown, Madison, and New London. Bus service is provided on an hourly or every-other-hour basis from approximately 7:00 AM to 6:00 PM, depending on the line. These routes operate at a headway of two hours or more due to the flexible service (deviating up to three quarters of a mile off the primary route) and long, out and back routes. In addition, ETD only connects to the town centers in East Haddam, Lyme, and Durham via reservation-based Dial-A-Ride service, requiring one day advanced notice. The ETD routes provide connection to the SLE commuter rail service which connects the region to New Haven and the Metro North rail service to New York and the CT rail service to Hartford and Springfield. Although the ETD routes are not coordinated with SLE trains, ETD's XtraMile program allows commuters to schedule their trip to meet any train at Old Saybrook or Westbrook Stations within XtraMile service area (Old Saybrook, Westbrook, and Essex) and hours. Although a more effective than the northern service, this transit system is still a less satisfactory alternative to private vehicle use in most circumstances due to convenience and commute time.

Active Commuters

Active commuting, or commuting by walking or bicycling, is not a viable option for most of the region. Only 3% of the region's working population walked to work and there is insufficient data on bicycle trips. Bicycle commuters likely fall into the 1% of residents using "other" modes of commuting. The lack of pedestrian and bicycle commuting is likely due to the relative distance residents must travel for work and the lack of adequate pedestrian and bicycle infrastructure.

KEY TAKEAWAYS

- *Car ownership is currently a necessity in much of the region.*
- *As the population continues to age there will be a need to improve non-automotive transportation services to meet increasing demand.*
- *Priority is shifting at the regional and interregional scale towards establishing multi-modal transit networks.*
- *Better transit connection to employment hubs, especially regional employment hubs, is needed.*
- *The lack of transit connection between employment hubs within the region and nearby population centers negatively impacts businesses.*
- *The time required to travel to major job centers by transit is likely a major barrier to increasing transit ridership.*

ENDNOTES

All references in this chapter are from RiverCOG's Metropolitan Transportation Plan (MTP), 2019 - 2025, unless noted otherwise below:

1 U.S.Census Bureau, Center for Economic Studies. "On The Map". 2015.

2 U.S.Census Bureau, Center for Economic Studies. "On The Map". 2015.

3 U.S.Census Bureau, Center for Economic Studies. "On The Map". 2015.

4 U.S.Census Bureau, Center for Economic Studies. "On The Map". 2015.

5 U.S.Census Bureau, Center for Economic Studies. "On The Map". 2015.

7. ECONOMIC DEVELOPMENT

7.1 INTRODUCTION

The economy in the Lower Connecticut River Valley region is driven by a mix of manufacturing, tourism, and small businesses. This section presents an overview of the economic drivers in the region and the relative impact of each.

7.2 EMPLOYMENT OVERVIEW

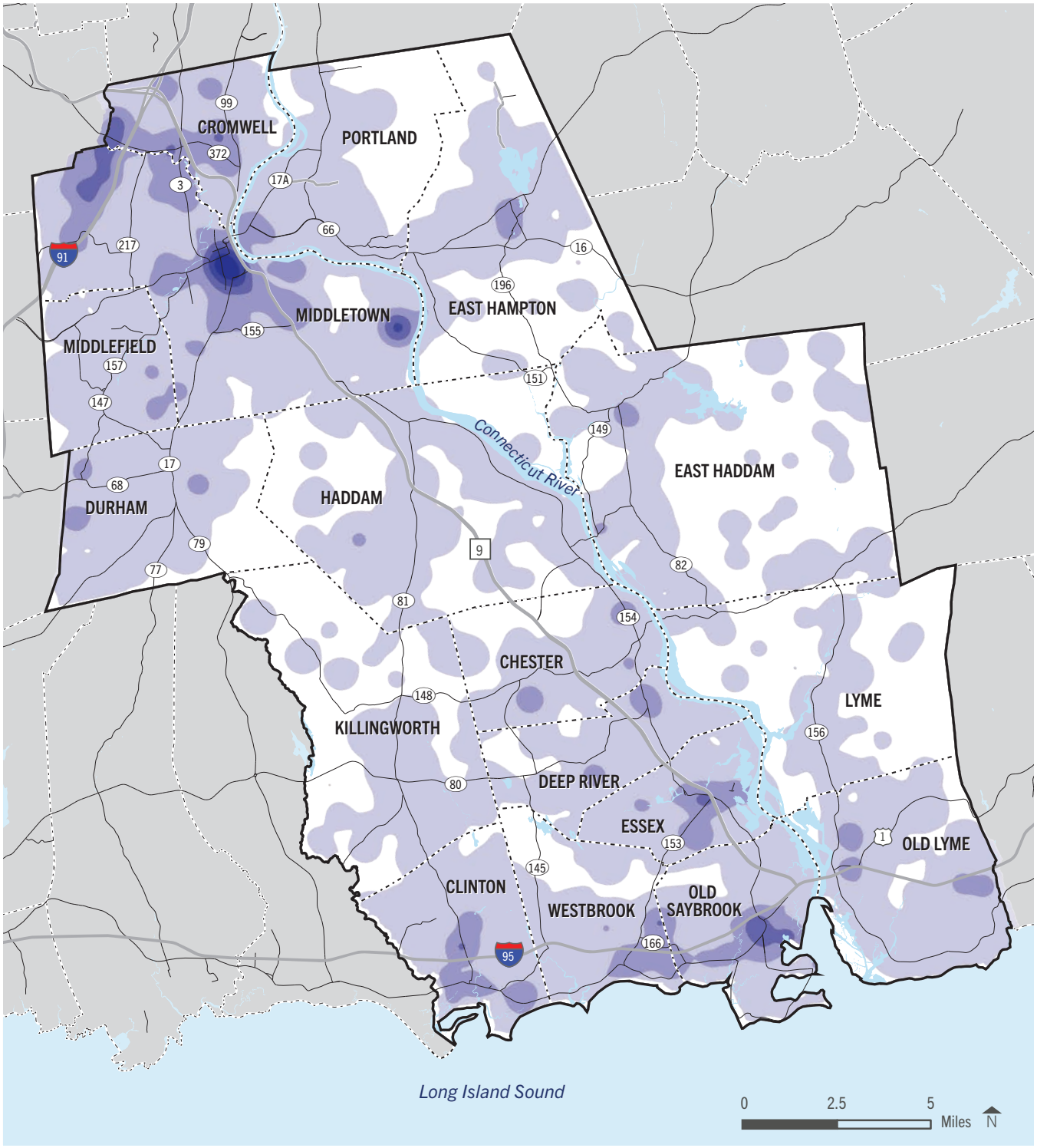
As of 2017, there were roughly 63,000 jobs in the region.[1] This represents a near full recovery following the 2008 recession. Middletown is the primary employment center for the region, accounting for over one third of the region's jobs. There are also strong employment centers in Cromwell, small town centers, industrial parks, and large commercial developments located along I-95 and Route 9.[2] Regional employment centers are shown in Figure 7-1.

The region has a workforce population of over 80,000 residents. Approximately 26,000 (32%) of the region's workforce population is employed within the region. This means that the region's residents hold roughly 41% of the region's jobs.[3] The approximately 37,000 remaining jobs are filled by commuters, primarily from the Meriden, New Britain, and Hartford areas.[4] Conversely, approximately 55,000 of the region's residents, or 46% of the region's workforce, is not employed within the region and commute to cities such as New London, Hartford, and New Haven.[5] Worker inflow and outflow for the region is shown in Figure 7-2.

Main Street Businesses, Deep River

Source: FHI

Figure 7-1. Regional Employment Centers

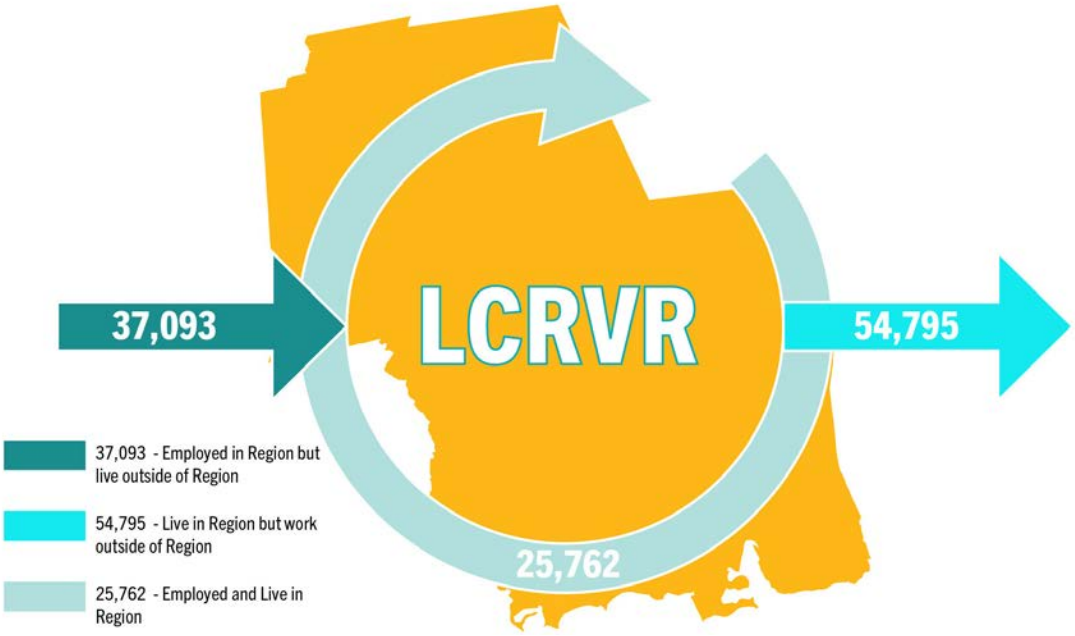


Number of Jobs

- 850 to 2,075 Jobs
- 275 to Under 850 Jobs
- 50 to Under 275 Jobs
- 5 to under 50 Jobs
- Under 5 Jobs

Source: U.S. Census Bureau. 2020. LEHD Origin-Destination Employment Statistics (2002-2017). Washington, DC: U.S. Census Bureau, Longitudinal-Employer Household Dynamics Program, at https://onthemap.ces.census.gov

Figure 7-2. Worker Flow



Source: U.S.Census Bureau, Center for Economic Studies. (2017). "On The Map". Retrieved from https://onthemap.ces.census.gov/

Table 7-1. Age of Workforce

Age	Residents		Workers	
	Count	*Share*	*Count*	*Share*
29 or Younger	15,954	19.8%	13,941	22.2%
30 to 54	41,182	51.1%	31,255	49.7%
55 or Older	23,421	29.1%	17,659	28.1%
Total	80,557	100%	62,855	100%

US Census Bureau, American Community Survey 2014-2018

7.3 LABOR FORCE

AGE

Table 7-1 shows the age distribution of both the region's workforce population and the workers employed in the region. As shown, there is little variation between the groups of workers. Approximately half of the workers in both categories are age 30 to 54, with roughly 20% age 29 or younger and roughly 30% age 55 or older.[6]

The bulk of the region's workforce population is made up of individuals between the age of 30 and 54. Those over the age of 55 are nearing retirement and those under age 29 are just beginning their careers. However, as further described in the Demographics section, the region's population is aging. Between 2000 and 2017, the region's median age increased by 18%, and as of 2018, the region had a median age of 45.6 years.[7] Approximately 27,000 of the region's residents are age 45 to 54and there are an estimated 33,800 residents over the age of 65 – a population projected to increase by more than 8,000 individuals by 2040. Conversely, there are only 19,000 residents age 35 to 44 and 18,500 residents age 25 to 34.[8] This means that a large portion of the region's population will be aging out of the workforce over the next ten years and the region has comparatively few younger residents available to replace them.

EDUCATION

Table 7-2 provides a breakdown of educational attainment for both the region's workforce population and the workers employed in the region. A plurality of both groups hold a Bachelor's degree or advanced degree while the smallest portion of both groups have less than a high school diploma.[9] The regional workforce population however holds slightly higher education levels, with a higher proportion holding a bachelors or advanced degree and smaller proportion having a high school diploma or less. This is consistent with the general levels of educational attainment for the region. As discussed in the Demographics section, as of 2017, 94% of residents had a high school diploma or equivalent, 42% had at least a bachelor's degree, and 19% had a graduate degree or higher.[10] This is a higher educational attainment rate than that of the state as a whole.

INCOME

Table 7-3 provides a breakdown of monthly earnings for both the region's workforce population and the workers employed in the region. Based on the table, those who work in the region have an overall lower monthly income than the regional workforce population.[11] A significantly larger portion of the regional workforce population makes more than $3,333 per month.

Table 7-2. Educational Attainment of Workforce

Educational Attainment	Residents		Workers	
	Count	*Share*	*Count*	*Share*
Less than high school	5,322	6.6%	4,864	7.7%
High school or equivalent	15,205	18.9%	12,782	20.3%
Some college or Associate degree	19,887	24.7%	15,462	24.6%
Bachelor's degree or advanced degree	24,189	30.0%	15,806	25.1%
Total	**80,557**	**100%**	**62,855**	**100%**

US Census Bureau, American Community Survey 2014-2018

Table 7-3. Workforce Income

Earnings Per Month	Residents		Workers	
	Count	*Share*	*Count*	*Share*
$1,250 or less	11,727	14.6%	11,160	17.8%
$1,250 to $3,333	18,860	23.4%	19,015	30.3%
More than $3,333	49,970	62.0%	32,680	52.0%
Total	**80,557**	**100%**	**62,855**	**100%**

US Census Bureau, American Community Survey 2014-2018

Local Business in Old Lyme

Source: RiverCOG

7.4 REGIONAL INDUSTRIES

Table 7-4 identifies 20 industrial sectors that make up the total number of jobs in the region. The table identifies for each industry the number of regional jobs and the number of jobs held by the region's workforce population. As shown, the region has five industry sectors that account for nearly 64% of the total jobs in the region: health care and social assistance, manufacturing, retail trade, educational services, and accommodation and food services.[12]

The jobs held by the region's workforce population are relatively consistent with the number of jobs in the region for each employment industry, with a few exceptions. Specifically, a substantially higher proportion of the regional workforce population is employed in finance and insurance (6.8% of the workforce population compared to 2.8% of jobs), while only a slightly higher proportion of the regional workforce population is employed in public administration, professional, scientific, and technical services, and educational services. Conversely, a smaller proportion of the region's workforce population is employed in four of the region's five major industry sectors: healthcare and social assistance, manufacturing, retail trade, and accommodation and food services.

Table 7-4. Industrial Sectors

Industry Sector	Jobs in the Region		Regional Workforce Population in Industry Sector	
	Count	*Share*	*Count*	*Share*
Healthcare and Social Assistance	**11,646**	**18.5%**	**12,711**	**15.8%**
Manufacturing	**9,218**	**14.7%**	**9,430**	**11.7%**
Retail Trade	**7,679**	**12.2%**	**8,057**	**10.2%**
Educational Services	**5,999**	**9.5%**	**9,020**	**11.2%**
Accommodation and Food Services	**5,400**	**8.6%**	**5,314**	**6.6%**
Construction	3,315	5.3%	3,632	4.5%
Professional, Scientific, and Technical Services	3,038	4.8%	5,276	6.5%
Administration & Support, Waste Management and Remediation	2,597	4.1%	3,318	4.1%
Wholesale Trade	2,790	4.4%	3,704	4.6%
Other Services (excluding Public Administration)	2,331	3.7%	2,691	3.3%
Finance and Insurance	1,774	2.8%	5,475	6.8%
Public Administration	1,748	2.8%	3,474	4.3%
Transportation and Warehousing	1,223	1.9%	1,830	2.3%
Arts, Entertainment, and Recreation	1,153	1.8%	1,676	2.1%
Management of Companies and Enterprises	875	1.4%	1,490	1.8%
Information	690	1.1%	1,701	2.1%
Real Estate and Rental and Leasing	519	0.8%	808	1.0%
Utilities	434	0.7%	594	0.7%
Agriculture, Forestry, Fishing and Hunting	420	0.7%	343	0.4%
Mining, Quarrying, and Oil and Gas Extraction	6	0.0%	13	0.0%
Total Jobs	**62,855**	**100%**	**80,557**	**100%**

Source: U.S.Census Bureau, Center for Economic Studies. (2017). "On The Map". Retrieved from https://onthemap.ces.census.gov/

HEALTHCARE AND SOCIAL ASSISTANCE

The largest employment sector in the region is the health care and social assistance field. This field includes medical professionals, psychologists, social workers, and counselors. It accounts for approximately 11,600 jobs, or 18.5% of all jobs in the region.[13] This industry also accounts for four of the five largest employers in the region – Connecticut Valley Hospital, International Society for Clinical Densitometry, Middlesex Hospital, and Middlesex Hospital Mental Health – each of which is predominately located in Middletown and accounts for over 1,000 jobs.[14]

MANUFACTURING

The region produces a wide range of manufactured goods. The largest manufacturing sectors include transportation equipment (including aircraft engines and parts), machinery manufacturing (including navigational equipment), and manufacturing for the medical fields.[15] In 2015, manufacturing paid the highest total wages of any sector, at roughly $700,000,000 annually, for an average annual wage of $78,000.[16]

RETAIL TRADE

Retail trade makes up approximately 12% of jobs in the region.[17] There are several types of retail trade in the region with differing regional impact. These are defined below and include chain or "big box" retail, regional destination retail, niche or boutique retail, and food retail.

Chain Retail

Chain or "big box" retail is typically found in Neighborhood Commercial Centers, as described in the ***Land Use*** section and are generally located in Cromwell, Middletown and Old Saybrook. Examples of chain retail include stores such as Walmart, Lowes, and Home Goods. This form of retail offers convenience and immediacy, the ability to locate and purchase a product in the same day. However, dramatic increase in online shopping has had a substantial impact on the utility of these stores and many are going out of business or moving to internet-only platforms.

Destination Retail

Destination retail is typically found in Regional Commercial Centers, as described in the ***Land Use*** section. This form of retail draws visitors from the within and outside the region to provide a largely recreational experience. Examples of destination retail include the region's two outlet malls - Clinton Crossing in Clinton and Westbrook Outlets (formerly Tanger Outlets) in Westbrook.

Niche/Boutique Retail

Niche and boutique retail is typically found in Historic Village Centers, as described in the Land Use section. Niche and boutique retail shops are typically independently owned and offer a more personalized experience. There is a substantial amount of boutique or niche retail throughout the region, particularly in Chester Center, Deep River Center, Essex Village, and along Main Street in Old Saybrook. Niche and boutique retail contribute to the character and charm of the region as part of an "experience economy." The experience economy has gained momentum in recent years in the face of declining retail trade, as it relates to the enjoyment of visiting the shops rather than the commodities sold there. These shops have become a tourism destination for shoppers who come to browse the unique inventories and combine their trips with stops at nearby restaurants, coffeeshops, or brewpubs.

Food Retail

The food retail sector is comprised of supermarkets and specialty food shops. Supermarkets are a major employer in 6 of the region's 17 towns and supply residents with a majority of their food needs. Supermarkets are expected to remain stable despite declining retail trade. Specialty food shops are closely tied to niche and boutique retail and similarly contribute to the experience economy. Notable examples of these stores are the Essex Chocolatier and Coffee Bar and the Cheese Shop of Centerbrook both of which are located in the village of Centerbrook in the municipality of Essex.

Clinton Crossing Outlet Mall

Source: RiverCOG

EDUCATIONAL SERVICES

The fourth largest sector of employment in the region is Educational Services. Approximately 9,000 of the region's jobs, or 9.5%, are in this sector. A majority of these jobs are in the region's public elementary and secondary schools. However, declining school enrollment threatens the long-term health of these jobs.

Public Schools

Since 2001, public school enrollment has declined sharply in many of the region's municipalities. The rate of decline during this period ranges from 35% in Westbrook to 7% in East Haddam.[18] Conversely, Cromwell and Regional District 4 (serving Chester, Deep River, and Essex) saw a net increase in enrollment of 6% and 7% respectively.[19] The decline in the number of teachers and other professionals has been less pronounced, ranging from a loss of 25% in Essex to a net gain of 7% in Westbrook.[20] As Westbrook has both the steepest decline in enrollment and the largest net increase in employment, it can be seen that the two metrics, enrollment and employment, are not always correlated but in most cases, schools with declining enrollments typically had a decline in the number of teachers. In many schools the decline in the number of teachers has occurred along with a rise in the number of paraprofessional instructors.

Private Schools

The Private School Review lists eight private schools in the LCRVR with an enrollment of 100 students or more. Mercy (Middletown) and Xavier (Middletown) each employ 50-99 faculty and staff. The Independent Day School (Middlefield) employs 20-49 faculty and staff. All other private schools in the region have less than twenty employees.

Higher Learning Institutions

There are three institutions of higher learning in the region. These are Wesleyan University in Middletown, Middlesex Community College in Middletown, and Holy Apostles Seminary in Cromwell. Wesleyan University is one of the largest employers in the region, with over 1,000 faculty and staff . Middlesex Community College employs over 200 faculty and staff members while Holy Apostles employs 50-99 faculty and staff members and Entech employs 10-19 faculty and staff.

ACCOMMODATION AND FOOD SERVICES

The accommodation and food services sector accounts for 5,400, or 8.6%, of jobs in the region.[21] Accommodation and food services includes restaurants and hotels and is closely linked with regional tourism. Major regional attractions like the Valley Railroad / Essex Steam Train, Gillette Castle, the Connecticut River, and Portland's Brownstone Exploration and Discovery Park bring significant numbers of tourists each year, which greatly benefits the accommodation and food services sectors as much of the money spent by tourists comes from outside the region. However, despite the robust tourism in the region, there are relatively few accommodations available. Providing additional accommodation facilities could increase the number of days a tourist stays in the region, and consequently the funds that tourist contributes to the regional economy.

SELF-EMPLOYMENT

While not an employment sector in the same sense as manufacturing, self-employment is a major component of the region's economy. Despite this sector's importance, it does not appear in traditional job statistics; likely because it can encompass many employment industries. According to RiverCOG's 2016 GrowSMART study, there are many self-employed individuals in the region providing services in the real estate, rental, and leasing, finance and insurance, construction, and professional scientific and technical services fields.[22] Many of these self-employed individuals are part of a so-called "lifestyle" economy – they are able to work from virtually anywhere but choose to live within region.[23] While many of these individuals work from home offices, there may be potential to incorporate them more directly in local economies, for example, by fostering networks for collaboration with other small businesses or encouraging purchases from other small businesses in the network. However, working remotely requires high-quality, reliable communication infrastructure, such as internet and telephone service. As discussed in the ***Infrastructure*** section, the region does not currently provide consistent access to these services.

EMPLOYMENT SCALE

The employment industries in the region are typically comprised of small and mid-sized businesses. Only 14 employers in the region have more than 250 employees. Four of the five largest regional employers were in the health care sector, with the Connecticut State Police being the fifth largest.[24] Twenty-five percent of employers have between ten and one hundred employees, while the majority, 52%, have less than four.[25] This lack of large business employers could reduce the region's attraction to potential workers and could also limit the region's resiliency in the event of future economic distress. Conversely, strengthening the viability of smaller businesses in the region could provide these businesses with greater resiliency and flexibility to respond to these economic challenges.

7.5 AGRICULTURE

Although Agriculture, Forestry, and Fishing and Hunting make up less than 1% of the region's jobs, the agriculture sector is nonetheless an important and land intensive component of the region's economy. As discussed in the ***Land Use*** section, agricultural land use accounts for approximately 11,119 acres or 4% of the region's acreage and includes over 400 farms.[26] These farms, along with other agricultural business, sell over $50 million in products annually.[27] This figure does not account for the industry's secondary economic impacts such as the purchase of farm supplies and equipment or spending on housing and other necessities for farmers and farm workers, all of which contribute to the local economy.

Increasing demand for locally grown food is an opportunity for regional agriculture, especially as consumers become more interested in, and aware of, the origins of their food. As the farm-to-table movement in restaurants becomes more popular, greater partnerships have developed between local restaurants and local farms. Further, in the face of climate change, which impacts transit time, delivery reliability, efficiency, and cost of food moving through national and global distribution chains, local agricultural operations can become a valuable food resource.[28]

Agritourism is another emerging opportunity for additional revenue on farms. In general, agritourism is any agriculturally based operation or activity that brings visitors to a farm. Agritourism activities can include pick-your-own orchards, wineries, farm breweries, hayrides, farm tours, farm to table dinners, farm festivals, and corn mazes. Many of the region's farms currently engage in forms of agritourism which contributes to regional character as well as the region's tourism economy.

Tiffany Farms in Lyme

Despite the importance of farms in the region, farmland faces competition from other land uses, as well as financial and demographic challenges that will need to be addressed in order to maintain the viability of agriculture into the future. For example, small-scale farmers are forced to compete against industrial scale agribusiness, which can produce cheaper food that can be available regardless of season. In addition, because farmland is relatively flat and cleared, it is usually easiest to develop for other uses and consequently faces development pressure.

By selling food and finished products locally (direct to consumer or to local restaurants), as well as providing the experience of buying directly from the farm, the region's agricultural industry has the potential to become an increasing part of the experience economy, allowing residents and tourists to better appreciate the value of agricultural land.

7.6 TOURISM

The region's tourism market is driven by its cultural, water-driven and natural resource assets.[29] Tourism is not accounted for in the employment sectors as it encompasses jobs from several sectors. However, the 2016 GrowSMART study estimated that regional tourism generated between 5,000 and 7,000 jobs with a payroll range of $120 to $170 million.[30] Figure 7-3 identifies some of the recreational and cultural attractions in the region.

Growth in the tourism economy would result in greater retail trade as well as growth in the accommodations and food services sectors. However, despite the abundance of tourism opportunities in the region, there is no clear connection between them, either logistically or through marketing efforts. In part because of this, it is difficult to convey to visitors how they should program a one, two, or three day stay in the region. Further, there is no convenient path of travel between destinations, particularly for travelers who do not have a car.

GrowSMART[31]

RiverCOG completed GrowSMART, a regional economic growth strategy for the region, in 2016. The strategy is rooted in an analysis of the region's assets, capabilities and challenges. Its purpose is to help define a desirable and feasible pathway to economic prosperity for each town as well as the collective region.

Key Challenges

GrowSMART identified the following challenges for economic development in the region:

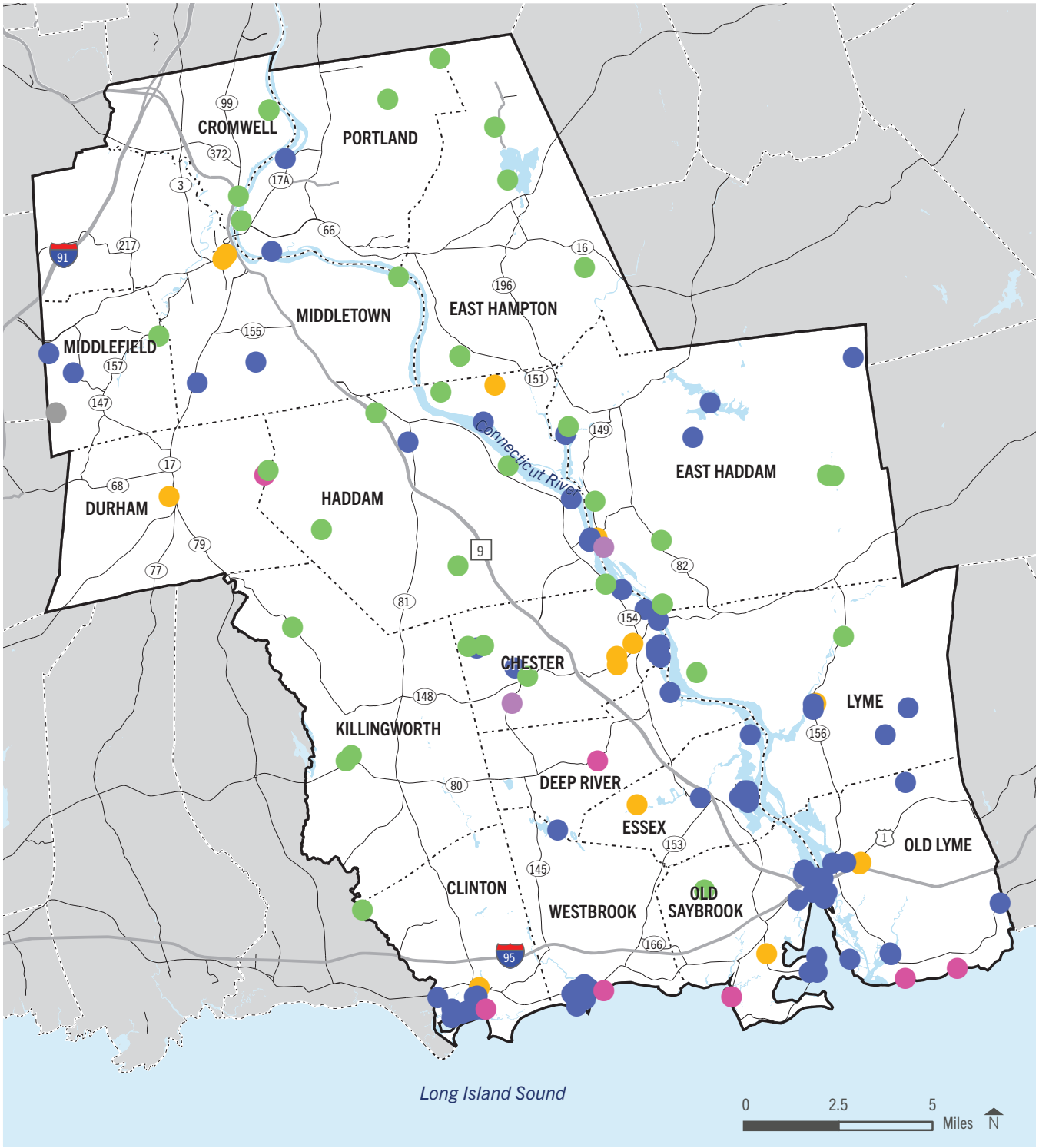
- **Lack of Affordable Housing:** The dependence of the region on workers from areas outside the region make it vulnerable to the loss of workers who may pursue work closer to home. Housing costs and the limited availability of rental apartments in most towns in the region make it impossible for many workers to live closer to where they work.
- **Aging Population:** The aging demographics of the region raises concerns over the long-term sustainability of the area's real estate market and businesses that need to attract workers with specialized skills.
- **Limited Water and Sewer Access Limit Quality Development:** Many municipalities in the region have limited sewer and public water. Therefore, septic and well infrastructures, which need to be spaced out to accommodate on-site disposal of wastewater, are being paid for by developers. This not only raises the cost of development, but contributes to the creation of density "islands" on greenfield sites that are removed from the region's existing main streets and town centers. These density islands detract from the quality of place and aesthetic appeal of many of the region's towns and contribute to the degradation of the natural environment through sprawl.
- **Limited Access to Infrastructure Impedes Business Attraction, Growth, and Retention:** In addition to public water and sewer facilities, most businesses are also reliant on quality internet and telephone service, wastewater management infrastructure, and access to multiple modes of transportation for shipping. GrowSMART identified few locations in the region that had sufficient infrastructure and were also zoned for commercial or industrial development.
- **Infrastructure is expensive**: Several municipalities in the region have industrial parks and commercial plazas or districts where the concentration of businesses can help to justify the investment needed to install infrastructure. Despite this, the costs are still quite high for most municipalities to shoulder on their own.

KEY RECOMMENDATIONS

GrowSMART set out a series of recommendations to create economic prosperity in the region. The following provides a summary of those recommendations.

- *Encourage communities to develop detailed and specific development design standards consistent with their characteristics and typologies.*
- *Target larger scale and more intensive development to areas with existing infrastructure or capacity to add additional infrastructure and consider a structure to share revenues and expenses.*
- *Create and integrate as necessary a full continuum of business creation, launch and bridge services to support a new generation of entrepreneurs and business owners in the region.*
- *Build on region's historic artist presence and manufacturing heritage by developing a facility that can support artisans in materials and food.*
- *Build on regional tourism efforts and focus on growing "wallet share" of tourism expenditures.*
- *Engage in a larger effort to develop and broadcast a compelling story about the region to attract tourists.*
- *Consider creation of a regional land bank to support housing development where infrastructure and multimodal transportation access is available.*
- *Work on creating destination communities for those seeking "just big enough" urban-type living environments.*
- *Consider creation of a regional development entity.*

Figure 7-3. Recreational Amenities



Type of Recreational Amenity

- Airport
- Arts and Cultural Facilities
- Boating Related Facilities
- Parks and Trail Facilities
- Beaches
- Skiing

Source: RiverCOG

ENDNOTES

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8. INFRASTRUCTURE

8.1 INTRODUCTION

Infrastructure is the basic physical structures and facilities needed for the operation of society, including sewer and wastewater, groundwater, energy, and telecommunication service. The existence and extent of such infrastructure throughout the region will influence where different types of development can and should take place. This section provides an overview of the current infrastructure in the Lower Connecticut River Valley region.

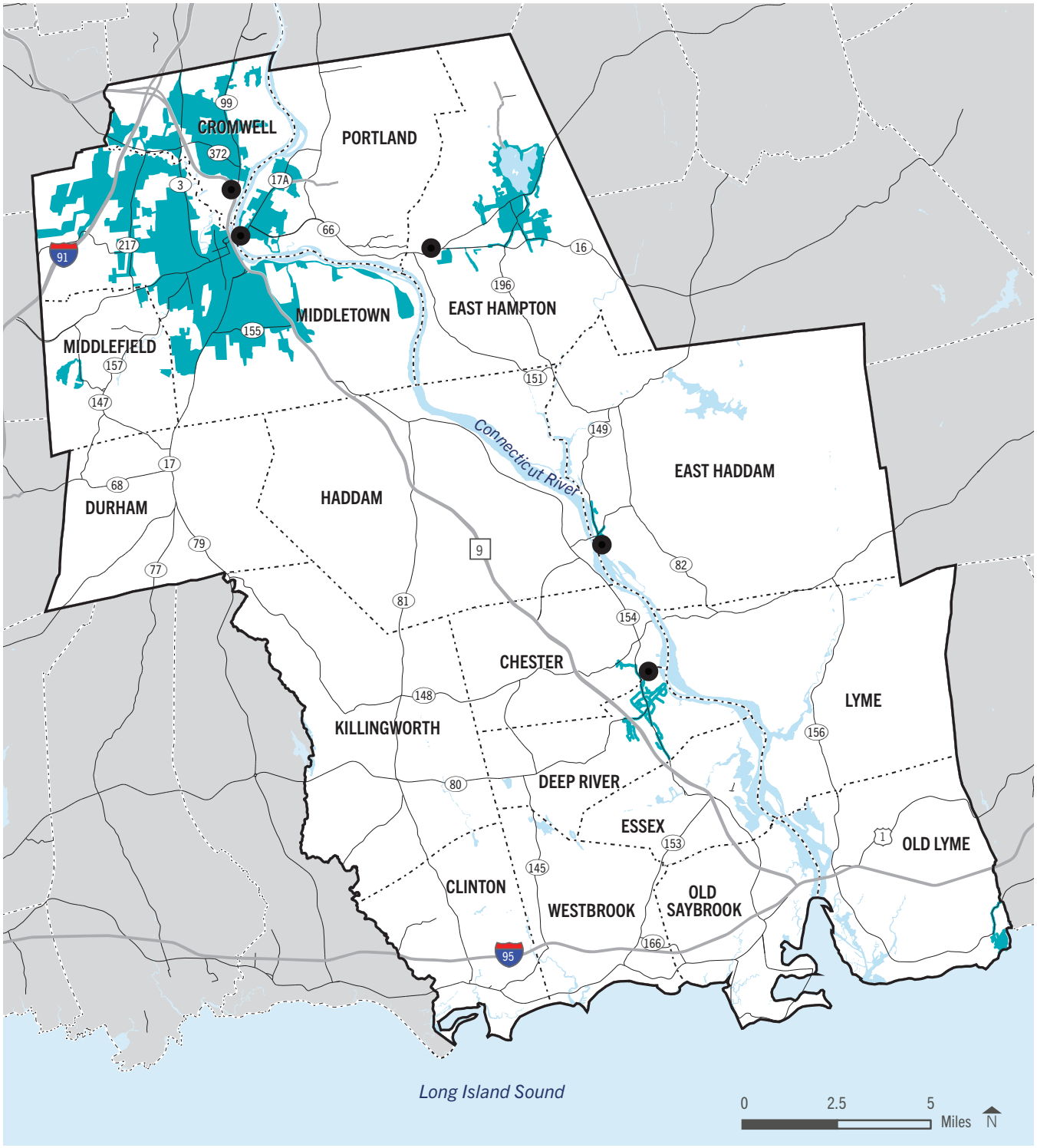
8.2 SEWER AND WASTEWATER

As shown in Figure 8-1, approximately 11 %, or 45,000 acres, of the region is served by sewer. This reaches approximately 35% of the region's population. Sewer infrastructure is largely concentrated in the northern portion of the region around Middletown and Cromwell. Smaller areas of Chester, Deep River, East Haddam, Middlefield, and Portland also have sewer service.

Areas not served by sewer are reliant on septic systems, which greatly limit the viability of many types of development. As discussed in the ***Housing*** section, density in the region has largely been dependent upon soil capacity to support onsite septic systems. Smaller lots with insufficient soil capacity cannot support septic for a multi-unit development. In addition, many types of commercial development, such as restaurants and office buildings, require large septic systems and substantial soil capacity. Sewers eliminate these constraints. For this reason, sewers have become a contentious topic in the region. Residents are concerned that expanding sewer into areas that are currently reliant on septic will lead to uncontrolled commercial and residential development.

Using sewer avoidance as a means of growth control can have unintended consequences for the region. Good soil for septic does not necessarily coincide with areas where development should occur. Therefore, an area in the center of town where higher density and commercial development may be desirable, may have insufficient soil capacity for a multi-unit residential development, restaurant, or office building. A developer may be required to purchase additional land to accommodate the septic load, which may not be available and would add to the expense of the project. Alternatively, a developer may choose to relocate the project outside of the town center, which may be less expensive or have better soil, but would not be the best location for development to occur. In either case, the lack of adequate soil capacity to support a septic system would contribute to a sprawling development pattern.

Figure 8-1. Sewer and Wastewater Infrastructure



Sewer and Wastewater Infrastructure Areas

- Sewer Treatment Facility
- Areas with Sewer and Wastewater Infrastructure

Source: RiverCOG

8.3 SURFACE AND GROUND WATER

The region's water supply comes from both surface and groundwater sources. Approximately 31% of the region's population receives water from reservoirs; the remaining 69% of the population gets their water from wells.[1] Only Chester, Middletown, and Portland get all or most of their water supply from reservoirs.

Approximately 46% (79,873) of residents in the region are served by public water systems.[2] The main water suppliers in the region, based on number of people served, are the Middletown Water Department (41,019), Cromwell Fire District Water Department (14,316), and the Connecticut Water Company (CTWC) which supplies 11,714 residents in the towns of Chester, East Haddam, East Hampton, Killingworth, Old Lyme, and Portland.[3] Durham now has public water supply from the Middletown Water Department. This feeds the Durham Center Water Company system, which is one of the nation's oldest continuously operating public water systems. Small-scale water systems serving apartment and condo complexes, nursing homes, and housing subdivisions can be found in all municipalities except Cromwell which has a single water supplier.[4] Privately owned wells serve the remainder of residents in the region.

Four municipalities have less than 1% of their population served by public water systems. These are Killingworth, Haddam, East Haddam, and Lyme. [5] Conversely, five municipalities have over 50% of their population served by public water systems. These are Chester, Cromwell, Middletown, Old Lyme, and Portland.[6] The remaining municipalities have between 2% and 23% of their populations served by public water systems.[7]

In East Hampton, where much of the town already has sewer and natural gas service, lack of public water is the primary limitation on future development. The town is under a consent agreement with the state to build additional public water capacity for areas of town with compromised groundwater and has been exploring options for expanding its existing small, publicly owned system.

8.4 ENERGY

CURRENT CONDITIONS

Energy is used to make our town's homes, businesses, and industry, and transportation run. In homes and businesses, energy is primarily used to maintain temperatures of indoor air and water, as well as to power lighting and appliances. In general, industrial uses require the greatest amount of energy to power manufacturing operations. In the United States, the industrial sector accounts for almost one-third of the country's total energy use.[8]

Energy can come from a variety of sources, the most common of which are natural gas, electricity, fuel oil, propane, and coal. Within the region, electricity is the predominant source of energy, which is generated primarily from power plants burning natural gas.[9] Major gas lines serving the region are shown in Figure 8-3. As can be seen, the region's major gas transmission pipelines are located in Cromwell and East Hampton, with Hazardous Liquid Piplines (carrying #2 fuel oil (diesel fuel)) spanning from Cromwell, through Middletown and Middlefield, to Durham. No major transmission lines are located in the southern portion of the region, limiting access to these energy sources.

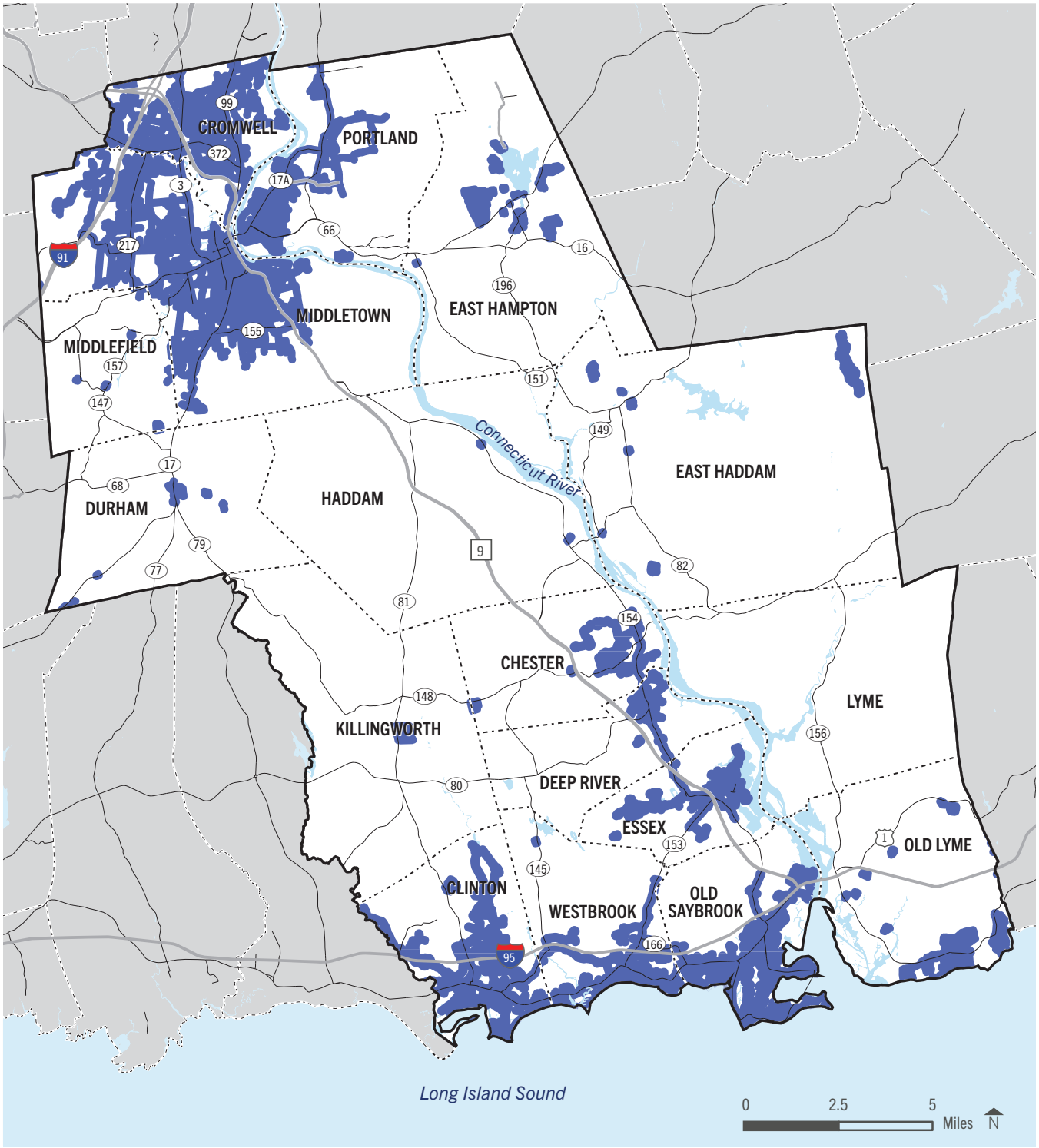
Possibly for this reason, as of 2018, a majority of housing units in the region, roughly 49% or 40,223 units, were heated using fuel oil or kerosene, while approximately 15% or 12,166 units were heated by electricity, and roughly 6% or 4,939 units were heated by bottled, tank, or LP gas.[10] Only 8% or 9,925 units were heated by natural gas.[11] This is a considerably lower proportion than found in more urbanized areas of the state. A breakdown of heating fuel for housing units in the region is shown in Table 8-1.

Table 8-1. Heating Fuel for Housing Units

Fuel Type	Number of Units	Percentage of Units
Utility Gas	9,925	8.3%
Bottled, Tank or LP Gas	4,939	6.0%
Electricity	12,166	14.8%
Fuel Oil, Kerosene, Etc.	40,223	48.9%
Coal	86	0.1%
Wood	2,658	3.2%
Solar	84	0.1%
Other Fuel	800	1.0%
No Fuel	260	0.3%

United States Census Bureau. (2015). House heating fuel. 2011-2015 American Community Survey

Figure 8-2. Public Water Infrastructure



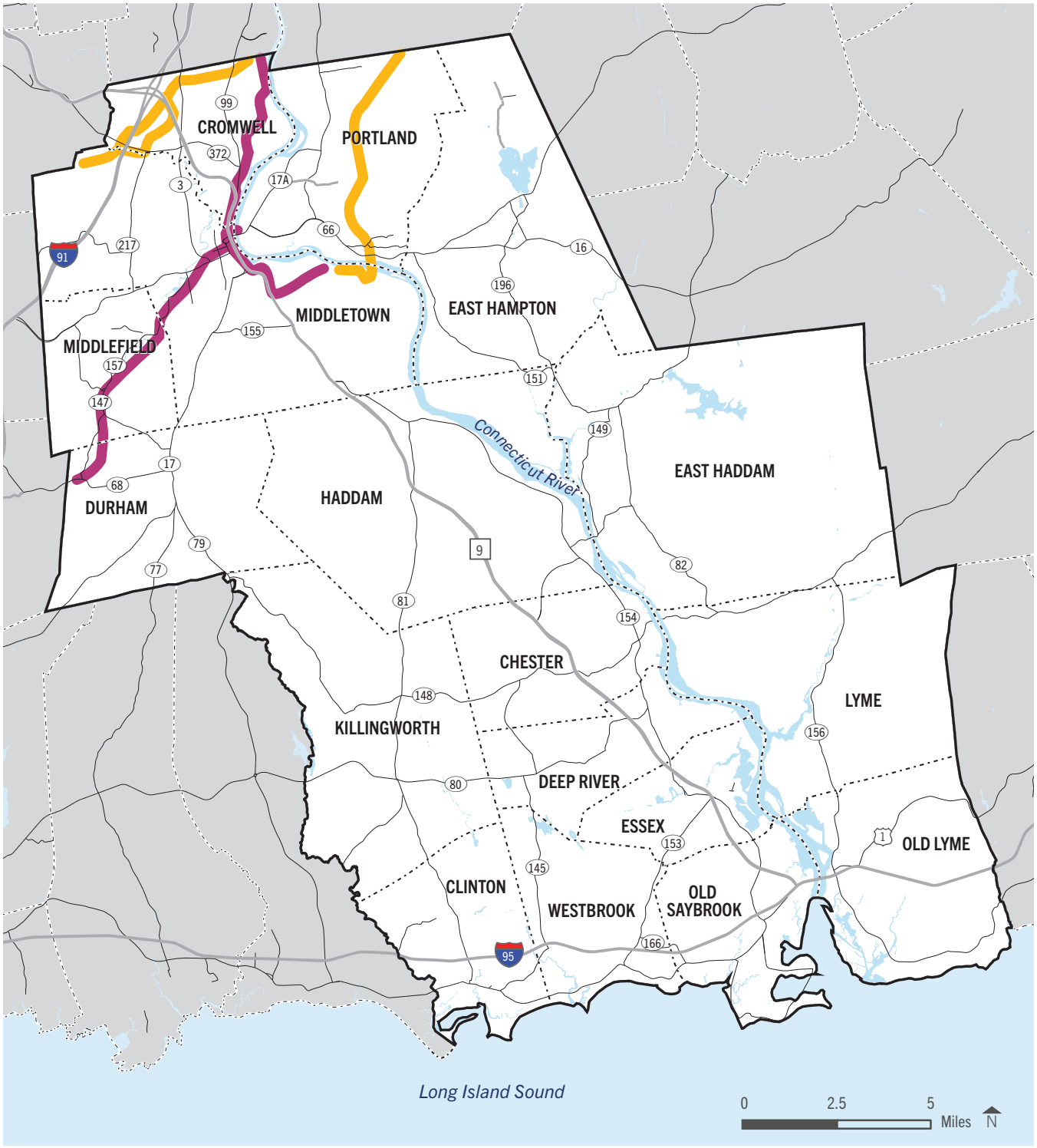
Public Water Supply

Areas with Public Water and Public Water Supplies per Department of Public Health (DPH)*

*Facilities with greater than 25 water users and DPH regulation

Source: RiverCOG

Figure 8-3. Energy Infrastructure



Energy Supply

Gas Transmission Pipelines

Hazardous Liquid Pipelines

Source: National Pipeline Mapping System (NPMS), Pipeline and Hazardous Materials Safety Administration, Accessed in February 2021, https://pvnpms.phmsa.dot.gov/PublicViewer/

SUSTAINABLE ENERGY

Sustainable energy focuses on renewable sources of power rather than sources which will ultimately be depleted, such as coal or natural gas. During the period from June 2019 to June 2020, renewable energy sources accounted for approximately 4% of the total electricity generated in the state.[12] [13] During this time, natural gas accounted for approximately 55% and nuclear for 39%.[14] [15] Of the renewable energy sources, biomass (approximately 2%) and hydroelectric (approximately 1.5%) were the most significant.[16] Wind (less than 0.1%) and solar (approximately 0.5%) were currently not large sources of energy.[17] However, Connecticut's solar generation output increased by 29% from June 2019 to June 2020.[18]

Solar Power

Solar technology has progressed greatly in the past two decades and its efficiency has increased while its installed costs have decreased. Regional solar power generation capacity is based entirely on local climatic conditions; and in the Northeast, utility-scale solar power generation is limited by cloud and snow cover. On a local scale, solar panels can be installed on the roofs of commercial buildings as well as private homes. With an average of 82 clear days per year and a total of 2,585 hours of sunshine, Connecticut does not possess as great a solar potential as other portions of the United States. Notwithstanding, the state of Connecticut has the capacity to generate an estimated 759 megawatts of solar power.[19] This accounts for approximately 2% of total electric generation capacity for the state. For solar power to become a major energy source in the region, there would have to be significant improvements in energy storage technology.

Biomass Energy

Biomass is renewable organic material that comes from plants and animals. Sources of biomass energy include wood and wood processing waste, agricultural crops and waste materials, biogenic materials in municipal solid waste (paper, cotton, wool, food, food and yard waste), and animal manure and human sewage. Biomass can be converted to energy through direct combustion, thermochemical conversion, chemical conversion, and biological conversion. Direct combustion, or burning, is the most common method.

Biomass accounts for a significant portion of Connecticut's renewable energy production.[20] Most of the biomass is biogenic municipal solid waste burned at five trash-to-energy plants located throughout the state.[21] Unfortunately, although there is biomass in the municipal waste that is burned at these trash-to-energy plants, a majority of the power comes from the petrochemical energy from plastics that are burned. This is not to say that true biomass energy production would not be viable in the region, particularly given the potential of its forests and the sizeable amount of agriculture and agricultural waste generated. There are currently no such true biomass energy plants located within the region.

Hydroelectric Energy

Hydroelectricity uses falling water to turn a turbine which then produces electricity through an electric generator. This is generally accomplished by building a dam on a large river that has a large drop in elevation. The many streams and rivers which once powered Connecticut's mills still have the capacity to generate an estimated 400 MW of power. However, many of the dams which powered these mills have aged and the streams that they impound do not possess sufficient force to generate a significant amount of electricity.

There may be potential for small scale hydroelectric energy generation in the region, but it will not likely become a major energy source.

Wind Power

Wind turbines generate energy by utilizing the wind's force to turn a propeller on a wind turbine, which spins a generator, creating electricity. Wind turbines function best in exposed areas where the wind is often strong and constant. This may include the coast, at the top of large hills and even out at sea. Turbines will not work as effectively in sheltered or forested areas, or areas where an abundance of birds are at risk of flying into them.

Connecticut's first utility-scale wind project was installed in 2015. Currently, there is a total of 5 MW of installed wind power generating capacity in operation in the state.[22] There is a single turbine located in New Haven harbor and two turbines located in Colebrook. The terrain in the region is not ideal for the installation of on-land turbine, however off-shore turbines have much greater potential.

The highest potential for wind power in the region is off-shore. Off-shore turbines, while larger than on-land turbines, are able to capture powerful ocean winds and generate vast amounts of energy. Connecticut has been aggressively pursuing making southeast Connecticut a hub for this activity.

8.5 TELECOMMUNICATION FACILITIES AND INTERNET CAPACITY

Wireless communication networks are a critically important infrastructure in the 21st century. In 2014, about 92 percent of the state's residents were wireless subscribers. Cellular coverage is reflective of population density, with higher density areas enjoying more comprehensive coverage. The region has better overall coverage than the largely rural northwest and northeast corners of the state, but poor coverage when compared to the state as a whole.

Of the seventeen municipalities in the region, only Lyme was considered to have significant areas of poor coverage based on availability of service providers.[23] However, there are many small areas within the region where existing coverage is inadequate and bandwidth and speed are suboptimal. This is due to the often-hilly topography of the landscape and limited number of cell towers. In particular, the Route 154 corridor in Haddam has spotty coverage which has prevented residents and police from communicating during emergency situations that occur in that area.[24]

Fiber-optic based broadband networks are capable of transmitting data faster than other broadband technologies. This infrastructure is critical to any users who require a high-speed internet connection, which includes businesses from larger employers to home based businesses. Fiber-optic broadband is available along the major transportation corridors within the region as well as areas with development density.

KEY TAKEAWAYS

- *Sewer service in the region is limited and development is impeded by septic limitations.*
- *Limited public water in the region is a critical hindrance to development in many of the region's towns, particularly in areas where there is already access to sewer and natural gas.*
- *As of 2018, a majority of housing units in the region, roughly 49% or 40,223 units, were heated by fuel oil or kerosene, while roughly 15% or 12,166 units were heated by electricity, and roughly 6% or 4,939 units were heated by bottled, tank, or LP gas. Only 8% or 9,925 units were heated by utility gas.*
- *There is some potential for small scale sustainable energy generation in the region.*
- *Developed portions of the Region tend to have better wireless and wired broadband service. There are areas in the Region with inadequate coverage due to limited infrastructure, topographic or landscape impediments. Current fixed broadband provider coverage data is available from the Federal Communications Commission at http://broadbandmap.fcc.gov/. The POCD supports efforts to improve internet access speeds across the region for better economic development, education and regional communication.*
- *The digital network will require substantial and continual modernization to make the region economically competitive.*

ENDNOTES

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2 https://portal.ct.gov/DPH/Drinking-Water/DWS/Public-Water-System-Lists

3 https://portal.ct.gov/DPH/Drinking-Water/DWS/Public-Water-System-Lists

4 https://portal.ct.gov/DPH/Drinking-Water/DWS/Public-Water-System-Lists

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9. NATURAL ENVIRONMENT

9.1 INTRODUCTION

The Lower Connecticut River Valley region contains a variety of natural resources, including rivers, streams, wetlands, coastal dunes and beaches, and vast forest land. These natural resources constitute primary habitats for the region's flora and fauna and support the migration routes for animals, particularly migratory birds, across the region. These abundant natural resources are unique to the region and drive strong conservation efforts.

9.2 CONNECTICUT RIVER AND COASTAL ESTUARY

The Connecticut River, which transects the region from north to south, is the longest river in New England, flowing 410 miles between Canada and the Long Island Sound.[1] Due to the presence of large, shifting sandbars at its mouth, the Connecticut River is the only major river in the Northeastern United States without an industrial port.[2] This contributes to the scenic and bucolic character of the River and its estuary, making it a destination for recreational fishing and boating.

The Connecticut River has seen both national and international recognition:

- The Nature Conservancy named the Connecticut River's tidelands one of the Western Hemisphere's "40 Last Great Places."[3]
- The Ramsar Treaty identified its estuary and tidal wetlands as one of 1,759 wetlands of international importance.[4]
- In 1997, the Connecticut River was designated one of only fourteen American Heritage Rivers, in recognition of its "distinctive natural, economic, agricultural, scenic, historic, cultural, and recreational qualities." The American Heritage Rivers initiative helps river communities seek federal assistance to protect environmental and natural resources, preserve historical and cultural resources, and promote economic revitalization along the river.[5]
- In May 2012, the Connecticut River was designated America's first and only National Blueway by the U.S. Department of Interior, in recognition of the restoration and preservation efforts on the river.[6]

Significant environmental cleanup efforts have benefitted the river since the second half of the twentieth century. The Connecticut River was once classified as water quality Class D, highly impaired. Since the Water Quality Act of 1965, that classification has been upgraded to Class B, which is considered fishable and swimmable. Environmental quality improvements are evident in the increase of freshwater fish species present in the Connecticut River. These include species such as American shad, Atlantic salmon, brook, trout, mussels, and blue crab. Migratory bird species and birds of prey have also seen a marked comeback over that past fifty years. Species such as the red-tailed hawk, osprey, cormorant, and American bald eagle are commonly sighted in the Lower Connecticut River Valley. The scenic and ecological quality of the lower Connecticut River and its hillsides have been protected and preserved by the Connecticut River Gateway Commission since 1973.

Figure 9-1. Gateway Conservation Zone

Gateway Conservation Zone

Source: RiverCOG, Connecticut River Gateway Commission

GATEWAY CONSERVATION ZONE[7]

In 1973, the Connecticut General Assembly passed legislation for the establishment of the Gateway Conservation Zone and its overseer, the Connecticut River Gateway Commission. The Gateway Conservation Zone is a state-local compact, allowing for special viewshed protections along the hillsides of the lower Connecticut River. The Gateway Conservation Zone, shown in Figure 9-1, is thirty miles in length and includes those areas lying within view of the river in eight of the region's towns: Chester, Deep River, East Haddam, Essex, Haddam, Lyme, Old Lyme, Old Saybrook.

The Gateway Commission is able to manage development and protect viewsheds within the Gateway Conservation Zone by establishing minimum standards for the locally adopted zoning regulations governing development. The Gateway Commission can also purchase scenic easements and development rights on visually important parts of the landscape, where there are willing sellers. Gateway standards have been adopted into each of the impacted town's zoning regulations. As such, projects that meet the local zoning regulations are presumed to be consistent with Gateway standards. The Gateway Commission also works with town planners and zoning enforcement officers to guide hillside development and preserve tree coverage along the river. This almost 50-year mission has aided greatly in the preservation of the scenic quality of the Lower Connecticut River Valley.

9.3 FOREST AND PARKS

REGIONAL FOREST LAND

The region is 59% forested, and this land is primarily privately owned. Conservation of this forest land has been a focus in the region through the Lower CT River and Coastal Region Forest Stewardship Initiative ("Stewardship Initiative") with the University of Connecticut and Connecticut Department of Energy and Environmental Protection (CT DEEP), and in collaboration with RiverCOG's Lower CT River Valley and Coastal Region Land Trust Exchange.

CT DEEP lands constitute approximately 36,600 acres (57 sq miles) or 13% of the region. Among these lands, 22,500 acres or 62% are comprised of acreage from 3 state forests: Cockaponset State Forest (15,130 acres within the region); Meshomasic State Forest (5,709 acres within the region); and Nehantic State Forest (1,670 acres within the region). Their management plans outline goals for forest health and productivity for wildlife and wood products.[8] These goals include:

- Creating a sustainable forest and ecosystem;
- Maintaining and creating healthy forest stands;
- Providing for late successional (LS) forests and retaining LS structure;
- Sustaining oak forests;
- Sustaining Pitch Pine
- Providing early successional habitat;
- Minimizing stream sedimentation by improving forest roads that can be stabilized and bridge crossings to minimize erosion;
- Controlling invasive species; and
- Promoting and protecting significant or critical habitat.

Private woodland owners and other persons and organizations interested in woodland management and conservation of forest resource have been introduced and offered training concerning these goals through the Stewardship Initiative.[9]

The region's land trusts play an important and active role in conservation efforts through the management, planning for, and management of, existing land trust properties.[10] They, along with other non-profit conservation organizations such as The Nature Conservancy (TNC), own approximately 10,000 acres or a little under 4% of the region.

Selden Neck State Park, Lyme

Source: hipcamp-res.cloudinary.com

STATE PARKS AND TRAIL FACILITIES[11]

There are many states parks, forests and trails within the region, as shown in Table 9-1. The region's state parks and forests provide opportunities for hiking, fishing, camping and other recreational uses. Each of the region's seventeen municipalities contain part of a state park or forest. This abundance of natural resources contributes to the region's reputation for scenic beauty and quality of life.

9.4 WILDLIFE RESERVES

The Stewart B. McKinney National Wildlife Refuge is located along the coast of Connecticut in various locations between Westbrook and Greenwich. Westbrook is the only municipality in the region to have the wildlife refuge located within its borders. The Menunketesuck/Duck Island complex and the Salt Meadow Unit are both part of the wildlife refuge and provide important resting, feeding, and nesting habitat for many species of birds, including the endangered roseate tern and the threatened piping plover, due to their location within the Atlantic Flyway. The Westbrook portion of the refuge consists of 316 acres of salt marsh, forest, grassland, and shrubland and serves as the headquarters and a visitor contact site, with an interpretive nature trail.

The region also contains the southernmost portion of the Silvio O. Conte National Fish and Wildlife Refuge, whose geographic focus is uniquely based on the entire watershed of the Connecticut River throughout the states of Connecticut, Massachusetts, New Hampshire, and Vermont. The region's portion of the Conte Refuge is now home to the Roger Tory Peterson Division, the Salmon River Division, and the Whalebone Cove Division of the refuge. Additionally, it contains the Wild and Scenic Eightmile River and parts of five Connecticut State designated greenways – the Menunketesuck – Cockaponset Regional Greenway, the Connecticut River Gateway Conservation Zone Greenway, the Eight Mile River Greenway, the Old Lyme Greenway, and parts of the Blue Blazed Trail System Greenways. These natural resources provide important habitat for the region's wildlife as well as recreational resources for the region's residents. The U.S. Fish and Wildlife Service, via the Conte Refuge, works with local land trusts and municipalities in acquiring and preserving valuable habitat within the Refuge's Areas of Interest.[12]

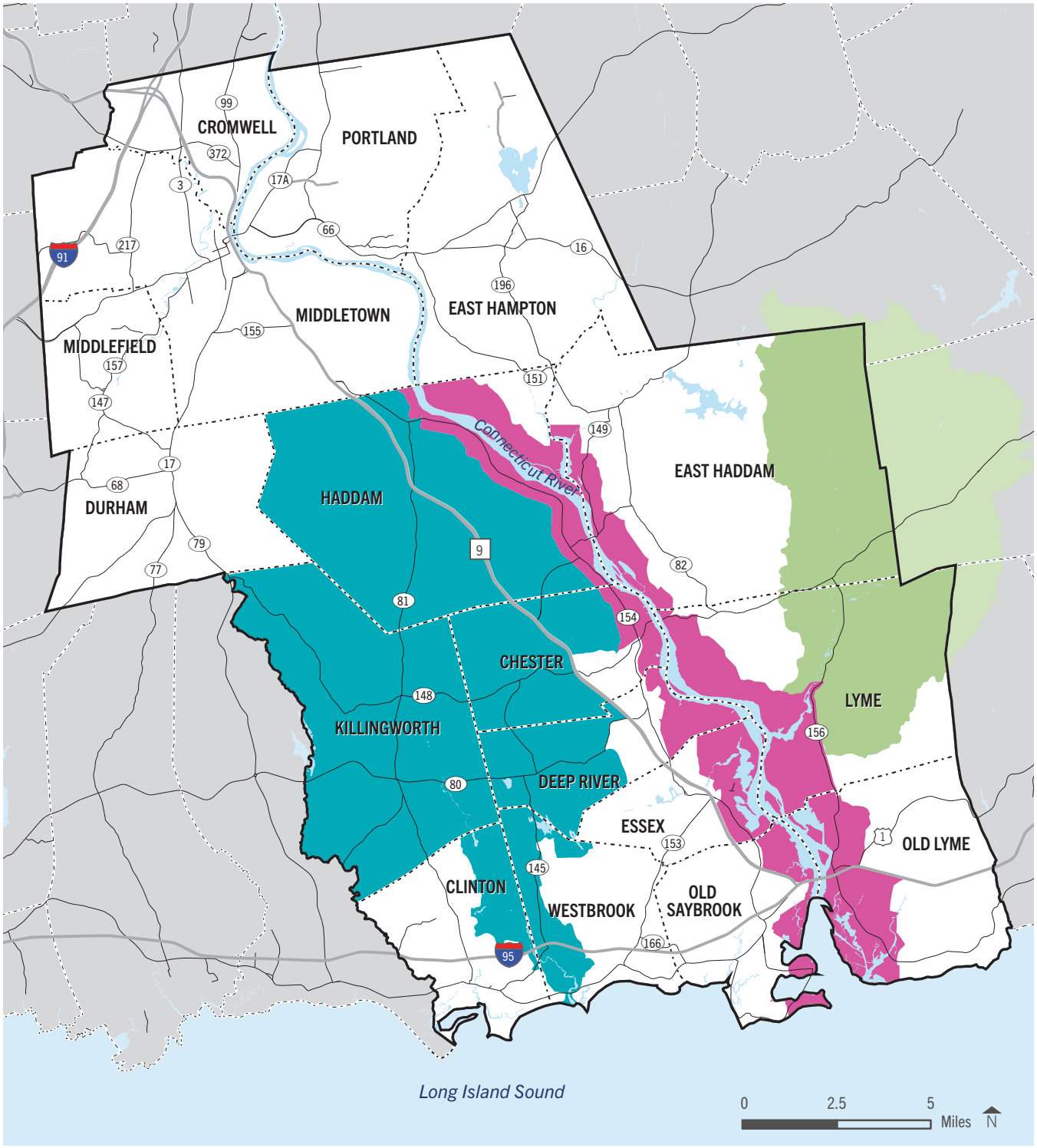
Salt Meadow at Stewart B McKinney, Westbrook

Table 9-1. State Parks and Forests

Park	Town
Air Line State Park Trail	East Hampton/Portland
Becket Hill State Park	Old Lyme
Brainard Homestead State Park	East Haddam
Chatfield Hollow State Park	Killingworth
Cockaponsett State Forest	Chester/ Haddam/ Westbrook
Connecticut Valley Railroad State Park	Essex
Dart Island State Park	Middletown
Devil's Hopyard State Park	East Haddam
Eagle Landing State Park	Haddam
Ferry Landing State Park	Old Lyme
George Dudley Seymour State Park	Haddam
Gillette Castle State Park	East Haddam
Haddam Island State Park	Haddam
Haddam Meadows State Park	Haddam
Higganum Reservoir State Park	Higganum
Hurd State Park	East Hampton
Machimoodus State Forest	East Haddam
Meshomasic State Forest	East Hampton/Portland
Millers Pond State Park	Durham
Nehantic State Forest	Lyme
Pattaconk Lake Recreation Area	Chester/Haddam
River Highlands State Park	Cromwell
Salmon River State Forest	East Haddam/East Hampton
Selden Neck State Park	Lyme
Sunrise Resort State Park	East Haddam
Tri-Mountain State Park	Durham/Wallingford
Wadsworth Falls State Park	Middlefield & Middletown

Source: RiverCOG, CT DEEP

Figure 9-2. Wildlife Reserves



Gateway Conservation Zone

Menunketesuck – Cockaponset Regional Greenway

Eightmile River Greenway

Source: RiverCOG, Connecticut River Gateway Commission

INVASIVE SPECIES

A variety of invasive species have proliferated in the LCRV region. Invasive species are alien to the regional ecosystem and cause or are likely to cause harm to the environment or human health. In many cases, invasive species are aggressive growers that can out-compete native species. Once established, invasive species of plants and animals destroy habitats and biodiversity as the native species are crowded out. Invasive species are usually quite hardy and adaptable, making them expensive and virtually impossible to eradicate.

Connecticut has been battling invasive species such as ornamental bittersweet, emerald ash borer, Asian longhorn beetle, and phragmites australis. In addition, the effects of aquatic invasive species such as the Eurasian water milfoil, fanwort, water chestnut, and hydrilla have harmed aquatic resources and recreation, impacting anglers, swimmers, and boaters.

The region has also experienced seasonal infestations of gypsy moths. These non-native insects have been in Connecticut for over 100 years and are known for consuming foliage of many species of trees such as oaks during the late Summer season. Southeastern Connecticut was hit particularly hard by Gypsy moth outbreaks between 2015 and 2017, which resulted in significant tree mortality in recent years. Effects of this die-off are noticeable throughout the region with many dead trees failing to grow foliage in the spring and summer month.

According to the UConn Extension, there are many dead trees in southern and eastern Connecticut as a result of invasive species. These include ash trees infested by the emerald ash borer but also many trees, including oaks, that have been infested with gypsy moths, the two-lined chestnut borer, and amarillia fungus.[13] Some roadways have as many as 30 to 40 dead trees per mile. High-risk trees are those larger trees which lean into or whose branches extend over the road. In a sampling of trees in East Haddam, 134 of these high-risk trees were found along 21 miles of roadway. Similar conditions were found in Higganum and likely exist in other parts of the region. The onus for removing dead trees falls upon landowners and municipalities. In many cases, the resources needed to achieve the removal of these trees are lacking. This represents a considerable public safety hazard.

Source: https://portal.ct.gov/DEEP/Invasive-Species/Invasive-Species

9.5 NATURAL DIVERSITY AREAS

The Connecticut Department of Energy and Environmental Protection (CT DEEP) designates Natural Diversity Areas that are home to important animal and plant species that cannot be readily replaced.[14] Data regarding the approximate locations of endangered, threatened, and special concern species is compiled and maintained in the Natural Diversity Data Base (NDDB). Data is collected by DEEP staff, scientists, conservation groups, and landowners. In some cases, locations are derived from literature, museum records or specimens. NDDB data is updated every six months. NDDB data is intended to identify potential impacts of development on these important animal and plant species.

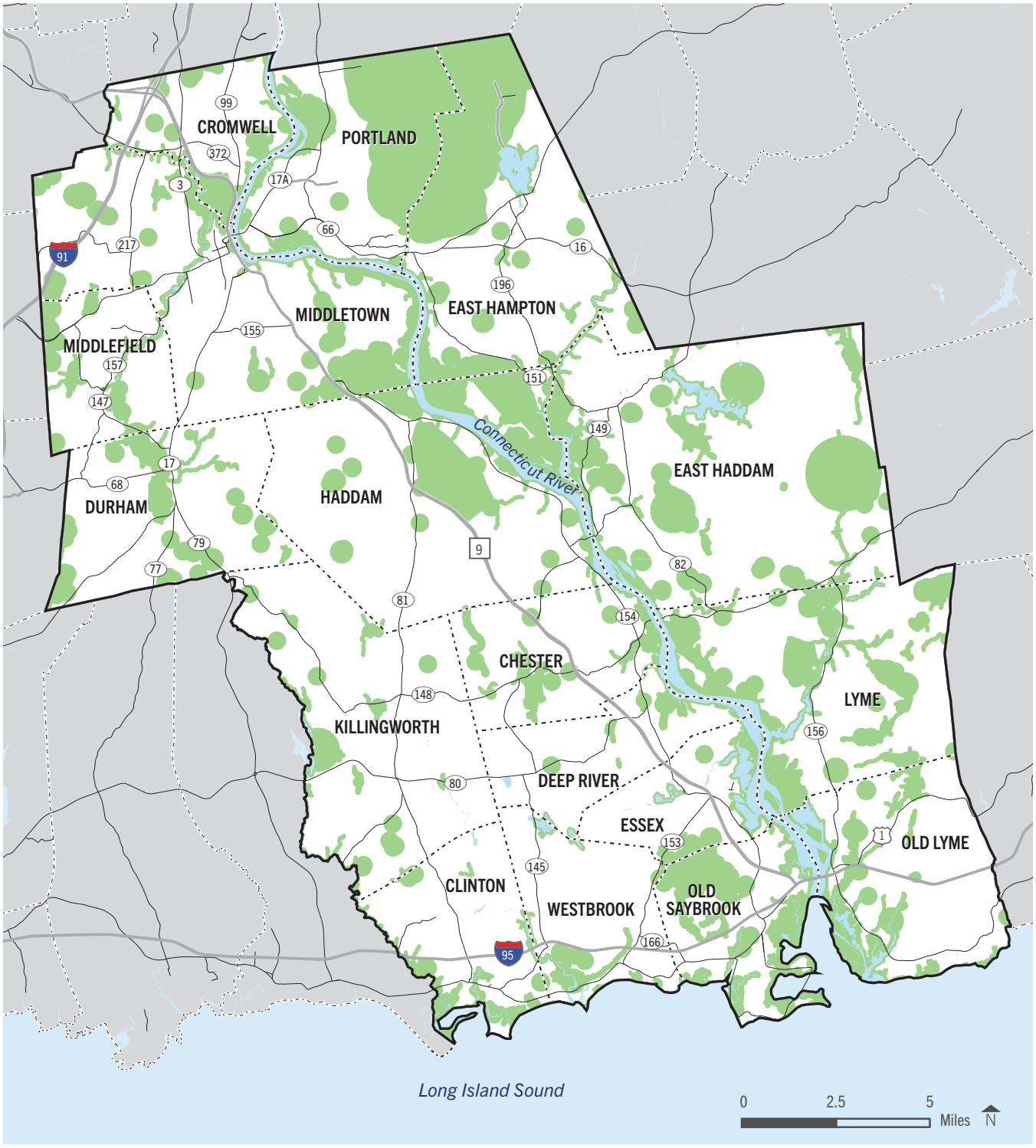
Figure 9-3 shows the location of Natural Diversity Areas based on June 2020 data. Approximately 50% of the region lies within a designated Natural Diversity Area. NDDB data is intended to identify potential impacts of development to state-listed species. The data is also used by groups to identify potential land for conservation. NDDB data was used in the creation of the Lower CT River and Coastal Region Land Trust Exchange Natural Resource Based Strategic Conservation Plan.

9.6 WETLANDS

Wetlands can be characterized either by vegetation or soil type. In Connecticut, inland wetlands are regulated by municipal inland wetlands agencies and delineated based on soil type.[15] All floodplain soils are considered wetlands soils. Tidal wetlands on the other hand are regulated exclusively by CT DEEP and are delineated based on their capacity to support certain wetland vegetation.[16] Inland and Tidal wetlands are mapped on Figure 9-4. There are approximately 43,000 acres of inland and tidal wetlands within the region, or roughly 16% of the region's total land area.

Wetlands support extremely diverse and productive wildlife habitats in the region, and the plant, animal, and bacteria populations are instrumental in removing many pollutants from ground and surface water. Municipal and state regulations are aimed at protecting wetland resources but required buffers and upland review areas for development vary. In addition, the typically high groundwater level in wetlands can impair septic system functioning, a particular challenge in the shoreline towns of Old Lyme, Old Saybrook, Westbrook and Clinton, making construction on or near wetlands difficult. Limiting development in and adjacent to wetlands is critical in protecting biodiversity, maintaining public water supplies, and reducing economic losses due to flooding.

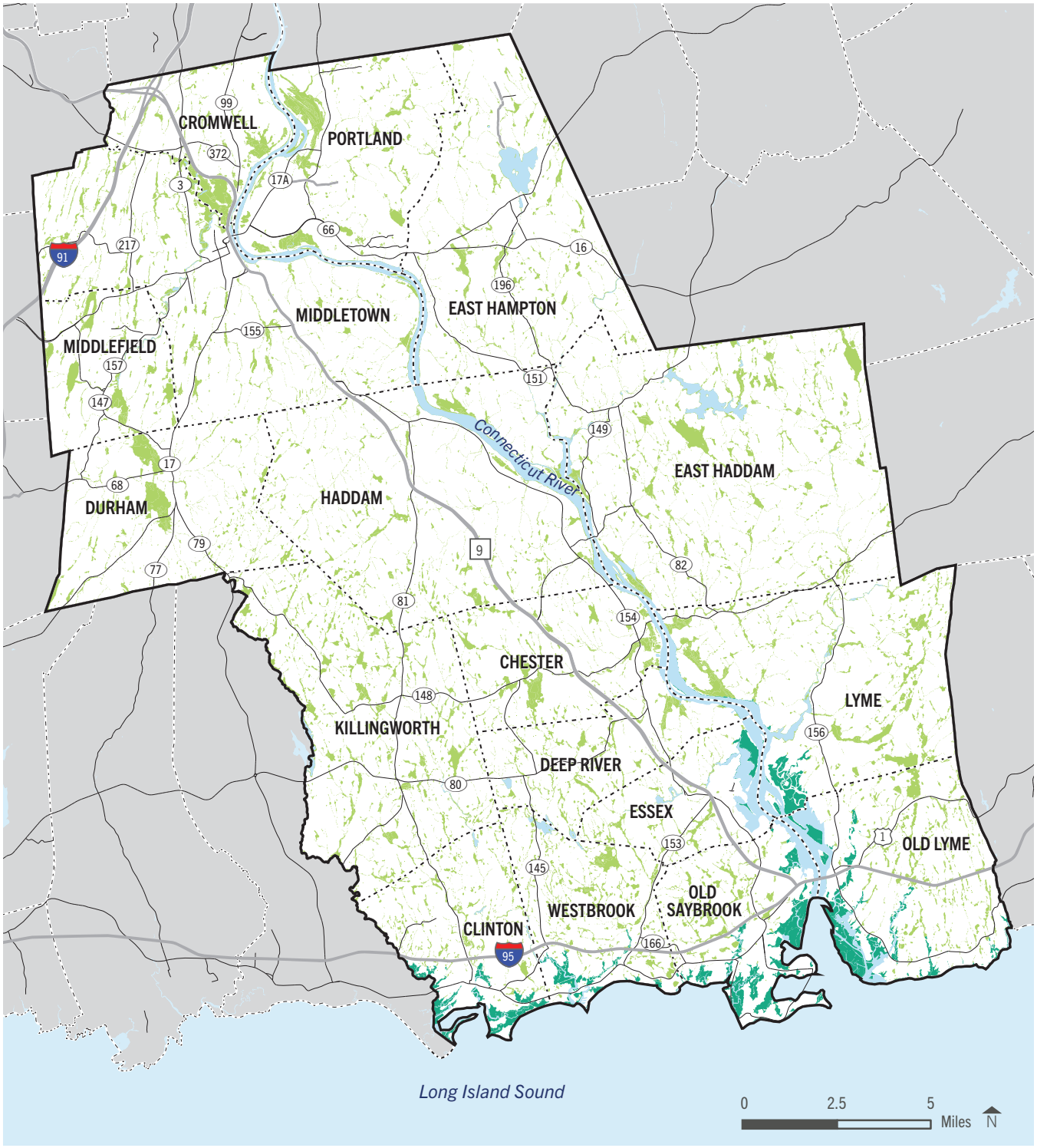
Figure 9-3. Natural Diversity Database Areas



Natural Diversity Database Areas

Source: CT DEEP, Natural Diversity Database Areas, Updated January 2021

Figure 9-4. Inland and Tidal Wetlands



Source: United States Fish and Wildlife, National Wetland Inventory, 2020

9.7 STEEP SLOPES

Steep slopes are typically defined as anything above a 20% incline, although the exact definition may vary by municipality. Slopes with a less than 10% incline are considered slight, while an 11% to 20% incline is considered moderate. Slopes in the region are shown in Figure 9-5. The region tends to have more steep slopes in inland towns such as Durham and Middlefield while the coastal communities of Old Saybrook, Old Lyme, Westbrook, and Clinton tend to have steep ledges in the north and relatively level coastal plains and moraines to the south. Significant areas on the hillsides above the lower Connecticut River, within the Gateway Conservation Zone, have slopes between 10 to 20% and sometimes more.

For development purposes, slight slopes are the easiest and most cost effective to build on; and sizeable industrial and commercial development generally require flat land. Beyond a 15% slope, costs begin to increase significantly as risks to public safety become greater and construction work becomes more difficult. Development on steep slopes is considered particularly dangerous and detrimental to the natural environment, in addition to being expensive.

9.8 VIEWSHEDS

Viewsheds are visual perspectives of landscapes that are aesthetically enhanced by either natural or human built features. These views can be important in defining the character of a place. The region is fortunate to contain viewsheds into a variety of landscapes such as farmlands, forests, and water bodies. Examples of important viewsheds include ridgelines like the Metacomet Ridge, viewsheds along the Route 9 scenic corridor, and streams and rivers included in the Connecticut River Gateway Conservation Zone. Other important viewsheds in the region include views between Chatfield Hollow State Park hiking trails in Killingworth (inland) and Long Island Sound as well as views from Devil's Hopyard and Gillette Caste State Parks in East Haddam. Views of agricultural properties in Durham and Lyme are also examples of important viewsheds in the region.

Viewshed protection is important to maintaining and enhancing the region's attractiveness, quality of life, wildlife, natural resources, and tourist economy.

9.9 NATURAL RESOURCE BASED STRATEGIC CONSERVATION PLAN

ABOUT THE CONSERVATION PLAN

In 2014 the RiverCOG worked with local land trusts, the Natural Resource Conservation Service (NRCS), U.S. Fish and Wildlife Service, State of CT Department of Energy and Environmental Protection (DEEP) Forestry and Inland Fisheries divisions, and the University of Connecticut (UConn) Forestry Extension to create a Natural Resource Based Strategic Conservation Plan ("the Conservation Plan") for the region. Technical assistance was provided by the National Park Service (NPS) Rivers, Trails and Conservation Assistance Program (RTCA).[17]

The Conservation Plan is grounded in the understanding that fragmentation of natural systems leads to degradation and that un-fragmented natural systems protect biodiversity, water quality, and air quality. The Conservation Plan used digital mapping Geographic Information Systems (GIS) data to analyze natural features such as critical natural habitats, wetlands, and land cover in the region. Through an extensive analysis process, the plan delineated Large Natural Areas (LNA's). The most significant of these LNA's were identified as primary conservation corridors and connecting conservation corridors. The Conservation Plan is not a parcel level analysis and does not dictate land use. Rather, it is meant to provide overarching guidance to municipalities and enable effective collaboration to create large connected areas of natural wildlife habitat, protect water quality, and preserve working land and scenic vistas.

FINDINGS OF THE CONSERVATION PLAN

The recommendations in the Conservation Plan are summarized in Figure 9-6, or "Map 1" in the Conservation Plan. Figure 9-6 identifies where a majority of important natural resources are located within and bordering the region as primary conservation corridors and connecting conservation corridors, other critical habitats, and endangered species locations. These areas, as determined by the Conservation Plan, are strategic for natural resource protection, best management practices, and/or permanent land conservation.

Figure 9-5. Steep Slopes

Source: CTDEEP, Connecticut Terrain Dataset

Chatfield Hollow State Park, Killingworth

Connecticut River in Old Saybrook

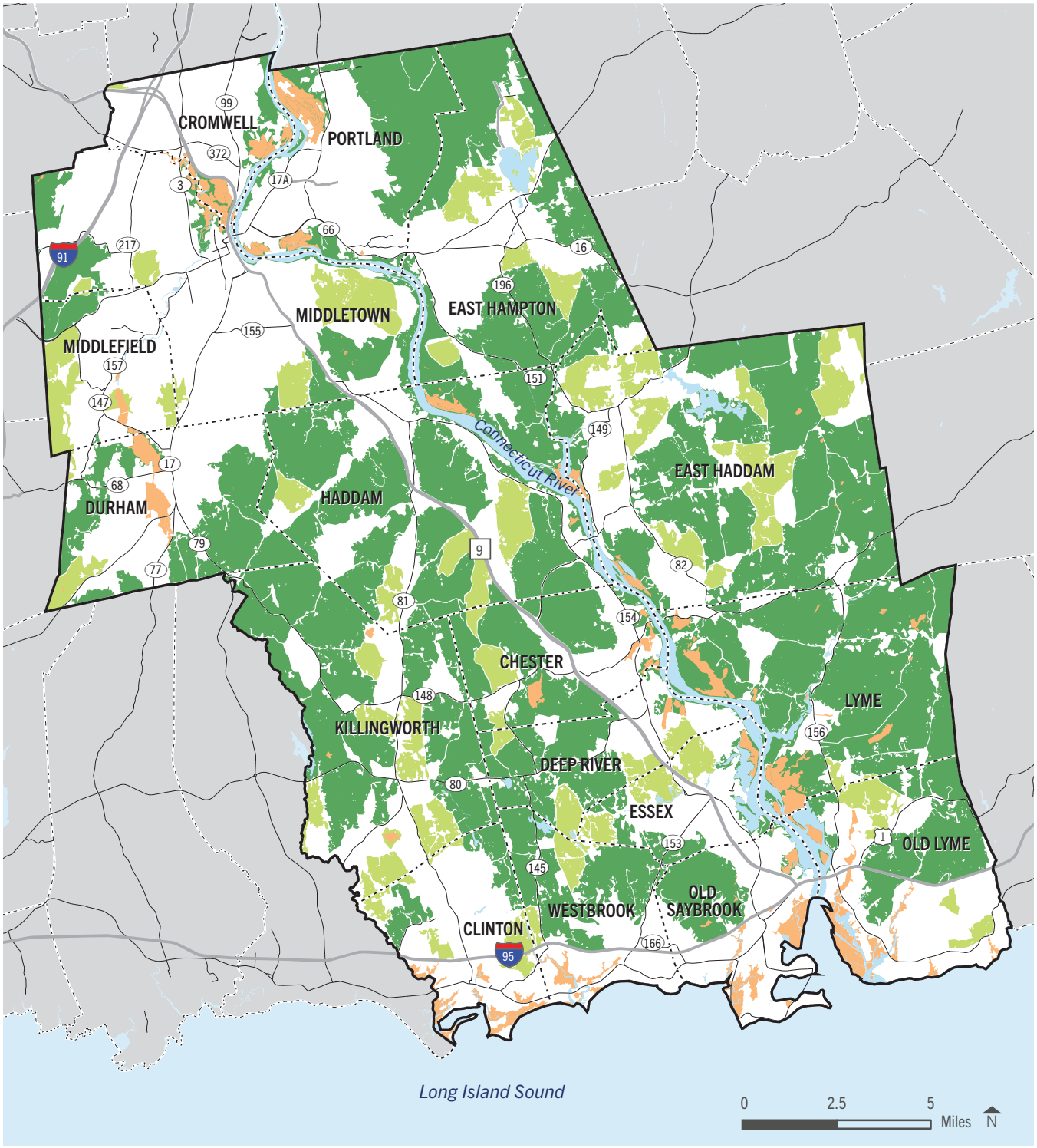
KEY TAKEAWAYS

- *The Connecticut River, which transects the region from north to south, is the longest river in New England, flowing 410 miles between Canada and the Long Island Sound. It is among the few major rivers, along the entire Eastern Seaboard, with a natural estuary.*
- *The region is 59% forested, and this land is primarily privately owned.*
- *All of the region's Municipalities contain a State Park or Forest.*
- *At least 5 of the region's Municipalities have divisions of US Fish and Wildlife Refuges.*

Gillette Castle State Park, East Haddam

Devil's Hopyard State Park, East Haddam

Figure 9-6. Conservation Corridors



Source: RiverCOG Lower CT Riverland Costal Regiion Land Trust Exchange Natrual Reosurce Based Startegic Conservation Plan, A GIS Overlay Analyiss

ENDNOTES

1 https://www.ctriver.org/learn/watershed-facts/

2 https://www.ctriver.org/learn/watershed-facts/

3 https://www.oldsaybrookct.gov/welcome-old-saybrook/pages/our-history

4 https://www.oldsaybrookct.gov/welcome-old-saybrook/pages/our-history

5 U.S. Environmental Protection Agency, Connecticut River Watershed Council, Inc. 1997. American Heritage Rivers Nomination Packet. 1998. The program as described by CT OLR research report, https://www.cga.ct.gov/PS99/rpt%5Colr%5Chtm/99-R-1299.htm

6 https://www.americanrivers.org/river/connecticut-river/

7 http://ctrivergateway.org/

8 https://portal.ct.gov/DEEP/Forestry/Management-on-State-Lands/Forest-Management-on-State-Lands

9 http://www.ctforestry.uconn.edu/stewardship/lcrcr.htm

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11 https://portal.ct.gov/DEEP/State-Parks/Listing-of-State-Parks

12 https://www.fws.gov/refuge/Silvio_O_Conte/

13 https://blog.extension.uconn.edu/tag/trees/#

14 https://portal.ct.gov/DEEP/Endangered-Species/Natural-Diversity-Data-Base-Maps

15 https://portal.ct.gov/DEEP/Water/Inland-Wetlands/Inland-Wetlands-and-Watercourses

16 https://portal.ct.gov/DEEP/Water/Wetlands/Connecticut-Wetlands

17 The Lower CT River and Coastal Region Land Trust Exchange, Natural Resource Based Strategic Conservation Plan, September 2014.

10. NATURAL HAZARDS

10.1 INTRODUCTION

Natural hazards are extreme natural events that pose a risk to people, property, infrastructure, and resources.[1] Floods, nor'easters, and hurricanes rank amongst the region's greatest concerns. This section examines some of the major natural hazards facing the region and their impact on the built and natural environment.

10.2 FLOOD RISK

FEMA 100-YEAR FLOOD ZONES

Coastal and river flooding occur within the region as a result of hurricanes, tropical and winter storms, normal seasonal river floor, changing weather patterns, and sea level rise. The Federal Emergency Management Agency (FEMA) 100-year Flood Zone applies to those areas where there is a 1% chance of flooding in any particular year.[2] Figure 10-1 identifies those areas of the region that fall within the FEMA 100-year Flood Zone. As shown:

- US Route 1 lies parallel to the Long Island Sound shoreline and is susceptible to flooding in many areas.
- Coastal development, including commercial properties and high value residential properties, located throughout Old Saybrook, Westbrook, and Clinton are susceptible to flooding.
- Areas along the Connecticut River and its tributaries are susceptible to flooding.

A breakdown of regional land uses within the FEMA 100- year Flood Zone are shown in Table 10-1, along with the percentage of flood zone acreage attributable to each.

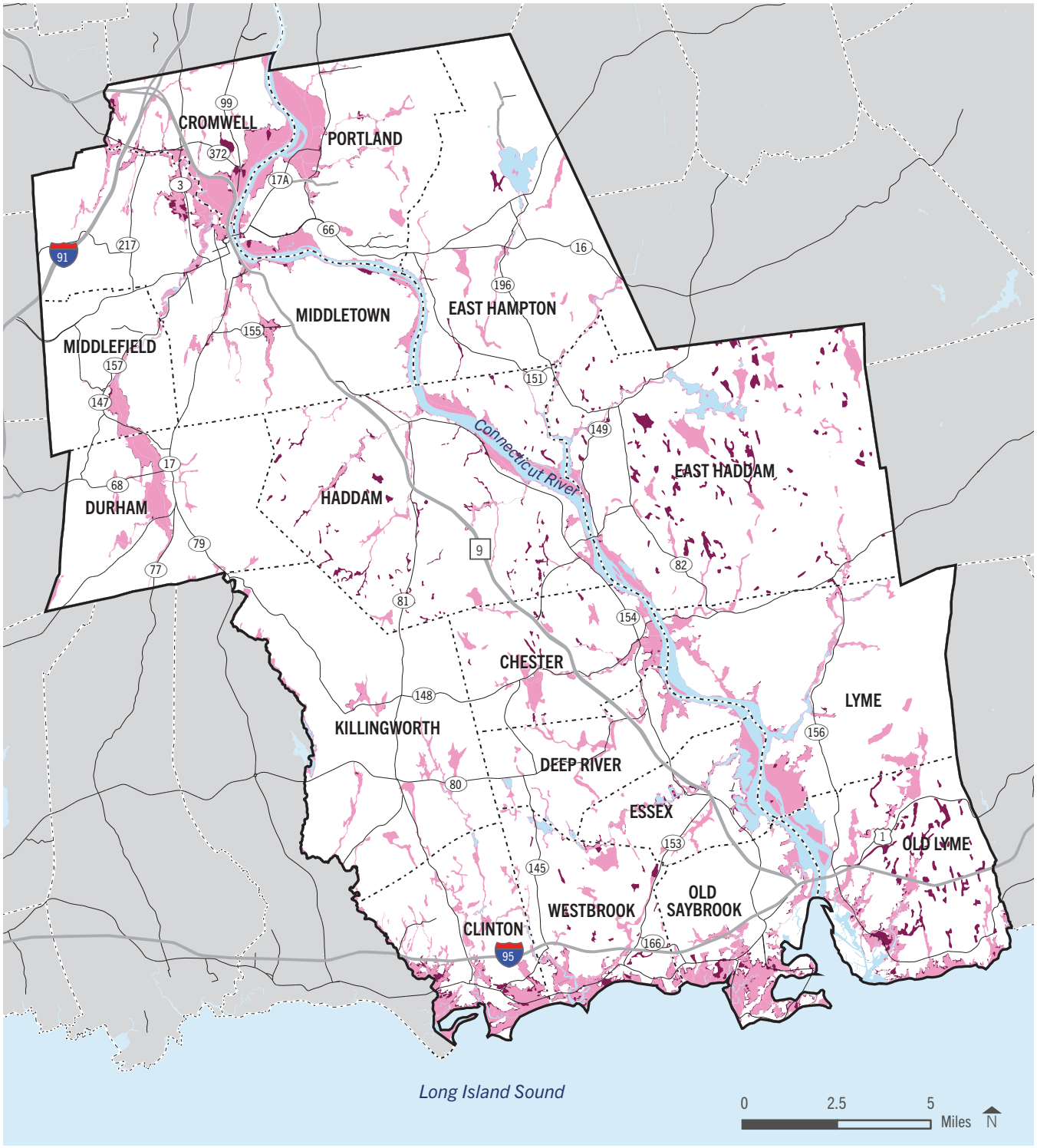
The largest percentage of land within the flood zone (29%) is designated Open Space. This designation is typically preferred within the flood zone because it does not add to impervious ground cover, which contributes to sheet flow of stormwater, and does not place development in danger of flood damage.[3] However, residential land uses account for 23% of acreage within the flood zone, placing residents and their homes in potential danger during a flood event. Although only 57 of the region's residents live in a census block group that is completely within the 100-Year Flood Zone, nearly 89,850 of the region's residents (52%) live in a census block group that intersects the 100-Year Flood Zone. This means that half of the region's residents could experience substantial impacts on their neighborhood during a major flooding event.

Table 10-1. Land Uses in the 100 Year Flood Zone

Land Use Type	Acreage in 100 Year Flood Zone	% of Total Acreage in Flood Zone
Commercial	8,800	9%
Industrial	3,300	3%
Non-Profit	4,300	5%
Open Space	27,700	29%
Public Utility/Transit	12,700	13%
Residential	21,900	23%
Unknown	3,900	4%
Vacant	12,500	13%
Total	95,100	100%

Analysis of RiverCOG land use, Grand List, and CT-DEEP Data

Figure 10-1. FEMA Flood Zones



FEMA 100-Year Flood Zone

FEMA 500-Year Flood Zone

Source: FEMA Flood Hazard Areas, DFIRM Database

Several major transportation corridors in the region are also susceptible to flooding. The Northeast Corridor railroad line, which runs along Long Island Sound, has been shut down several times in recent years due to coastal flooding, even though most of the railroad is elevated out of the flood zone. Route 9 in Middletown is also vulnerable to seasonal flooding along the Connecticut River, disrupting the region's primary north-south corridor.

RIVERCOG FLOOD RESILIENCY STUDY

RiverCOG recently completed its Long-Term Recovery and Land Use Resiliency Through Community Flood Resilience Study, Flood Susceptibility Mapping for the Lower Connecticut River Valley ("Flood Resilience Study").[4] The study was conducted to help bridge the flood hazard data gap for municipalities without detailed flood studies and to investigate less expensive / more cost-effective models for predicting flood susceptible areas.

The Flood Resilience Study focused on inland flooding and considered a combination of regional climatic factors and non-climate factors related to natural, physical, and developed characteristics in the region.[5] Based on that information, it estimated flood susceptibility not due to climate change and considered climatic mechanisms that correlate with existing and projected rainfall in the region. Several flood risk factors, including elevation, slope, land curvature, distance to water body, land cover, vegetative density, surficial materials, soil drainage class, and percent impervious surface, were evaluated with the objective of linking each to the occurrence of flooding or a flood event having a recurrence interval of at least 100 years.[6]

The study revealed that the region may have as much as 8% more developed land within the 100-year Flood Zone than what is currently shown on the FEMA maps.[7] Therefore, there are likely more properties at risk during a major flood event than have been identified by FEMA.

10.3 HURRICANE IMPACTED AREAS

Hurricanes can have particularly devastating impacts within the region. As the region abuts the Long Island Sound, it is uniquely susceptible to high winds that have not been attenuated by land. In combination, the region's forested landscape creates particular risk of fallen trees from high winds, which can obstruct roads and cause damage to property and overhead power lines. Hurricanes can also produce water surges that lead to additional flooding impacts. Figure 10-2 identifies hurricane vulnerable areas based on hurricane surge inundation zones. These zones predict the inundation that can be expected to result from a worst-case combination of hurricane landfall location, forward speed, and direction for each hurricane category.

Approximately 14 % of the Region's population lives within a Category 1, 2, or 3 Hurricane inundation zone. These areas often overlap with the FEMA 100-year Flood Zone and are also in danger of damage from other flood events. The shoreline areas in Old Saybrook, Westbrook, and Clinton are in particular danger during a hurricane.

10.4 CLIMATE CHANGE AND SEA LEVEL RISE

Due to climate change, Connecticut can expect to see substantial impacts from rising sea levels and increases to seasonal rainfall and the intensity of storm events.[8] Temperature increases in the summer are expected to lead to more severe rainfall intensities, and flood protection measures will become more challenging. As the frequency, duration, and intensity of rainfall increases, the region will need to contend with heavier flooding, additional stormwater runoff, further adverse impacts to surface water quality, and worsening erosion and sedimentation deposition.[9]

Sea level rise can have a variety of impacts on the natural and built environment, including changes to habitat area and increased vulnerability of buildings, roads, and transit systems to damage from storms and flooding. A two-foot sea level rise is projected for the region by 2050; the projected impact areas are shown in Figure 10-3.[10] The coastal communities of Old Lyme, Old Saybrook, Westbrook, and Clinton, which have dense residential and commercial development, will be most vulnerable to the impacts of sea level rise. However, properties along the Connecticut River can also expect to see significant impacts as the river is tidally influenced. Overall, approximately 14% of the land area in the region is projected to be impacted by sea level rise and approximately 400 residents can expect to have sea level rise impact their properties.

Beach front cottage after Sandy, Old Saybrook

Source: Green Cities Blue Waters

Figure 10-2. Hurricane Inundation Zones

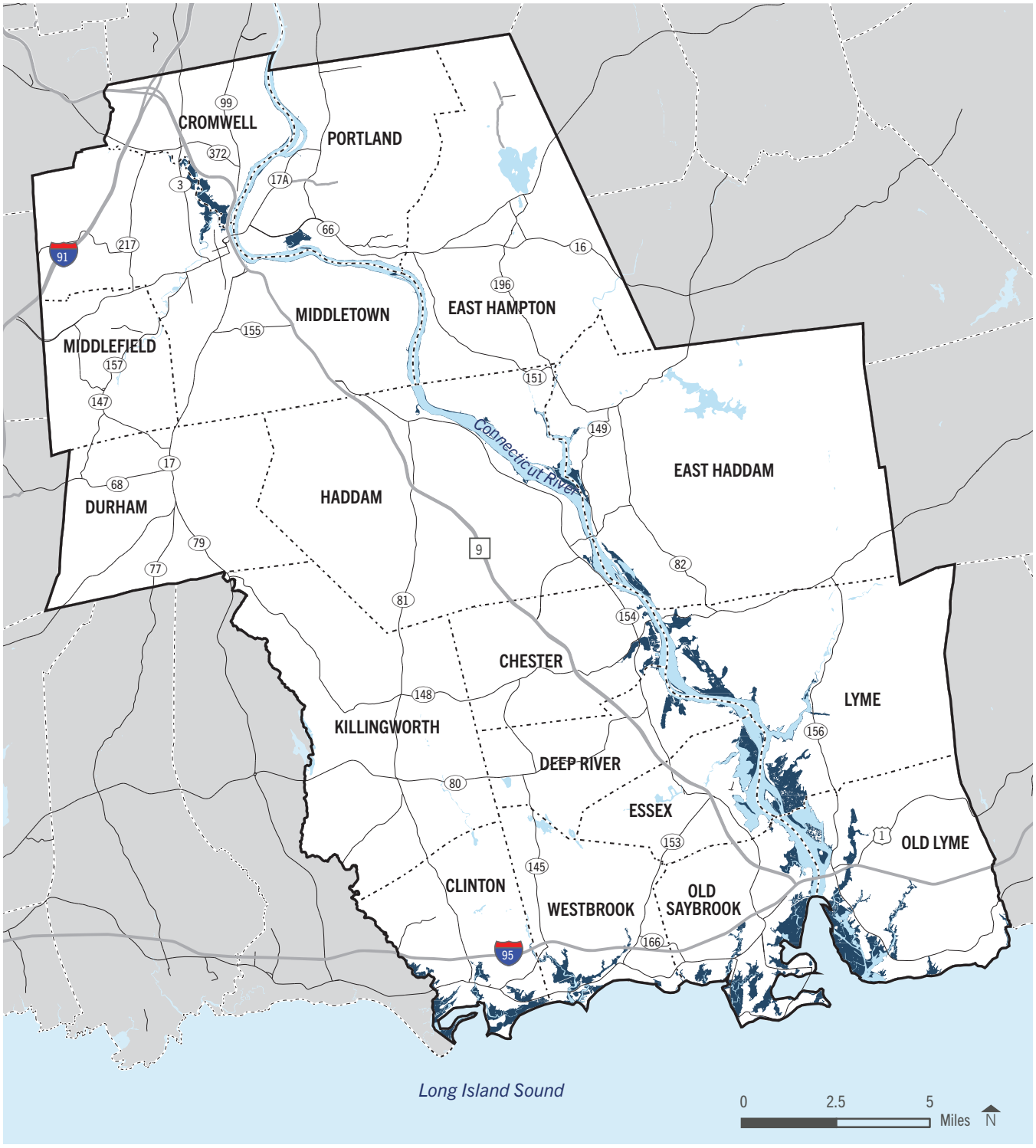
Category 1 Hurricane Event

Category 2 Hurricane Event

Category 3 Hurricane Event

Source: FEMA Flood Hazard Areas, DFIRM Database

Figure 10-3. Projected Sea Level Rise Inundation



NOAA 2 Foot Projected Sea Level Rise Inundation

Source: NOAA Sea Level Rise Viewer; https://coast.noaa.gov/slr/#/layer/slr

10.5 STORMWATER MITIGATION

In an undeveloped environment, rain and snow melt slowly filter through plants, tree roots, and leaf coverage before returning to the soil and reentering the groundwater supply. However, impervious surfaces, such as asphalt and concrete for roadways and parking lots, and even building roofs, prevent the rain and snow melt from completing this natural process.[11] Instead, water accumulates on these paved surfaces causing flooding and runoff and picks up garbage and chemicals as it travels to storm drains before being discharged into lakes, rivers, and the Long Island Sound.[12] Stormwater[13] runoff not only contributes to the degradation of the region's natural water supplies, but drastically diminishes the groundwater supply by preventing the water's natural filtration and reentry.[14]

Over 1,900 acres of impervious surface in the region is located within the 100-year Flood Zone. This is approximately 5% of the region's total flood zone area. Approximately 1,050 acres of impervious surface in the region is located within the Hurricane Inundation Zones. This represents approximately 10% of the region's total hurricane inundation area. Although the overall percentage is small, impervious surfaces in these areas will exacerbate flooding during storm events.

10.6 NATURAL HAZARD MITIGATION PLANNING

Natural Hazard Mitigation Plans, and the actions taken as a result of their recommendations, are intended to reduce or eliminate long-term natural hazards and their effects.[15] These plans are required by the Federal Emergency Management Agency (FEMA) in order for municipalities to be eligible for FEMA hazard mitigation grants and must be updated every 5 years for municipalities to remain eligible for grant funding. Natural Hazard Mitigation Plans provide an important opportunity for communities to come together and assess their ability to withstand and recover from a natural disaster and prioritize mitigation actions.

- Reduce loss of life and damage to property and infrastructure;
- Reduce costs to residents and businesses related to insurance, repair costs, and taxes;
- Reduce municipal service costs (e.g. emergency response and infrastructure maintenance);
- Educate residents and policy makers concerning natural hazards and mitigation possibilities;
- Connect hazard mitigation planning activities to other community planning efforts; and
- Enhance and preserve the natural resources systems.[16]

Every community is unique, but some common mitigation actions include the replacement of undersized culverts, the flood proofing of schools and municipal buildings , the purchase of flood prone property for open space, or the creation of educational material concerning natural hazards and mitigation actions for the community's citizens.[17]

RiverCOG completed Natural Hazard Mitigation Plans for each of the region's 17 municipalities in 2014. Old Saybrook and Westbrook updated their plans in 2019 and RiverCOG will complete an update for the remaining 15 municipalities by the end of calendar year 2020.[18]

Harbor Park Flooding, Middletown

Source: RiverCOG

KEY TAKEAWAYS

- *Within the region, 95,100 acres are located in the 100-year Flood Zone. Approximately 29% of that acreage is designated as open space while 23% is residential.*
- *Approximately 57 people live in a block group that is completely within the 100-Year Flood Zone. However, nearly 89,850 of the Region's residents live in a Census Block that intersects the 100-Year Flood Zone. Thus, half of the region's residents could experience substantial impacts on their neighborhood in the event of a major flooding event.*
- *Approximately 23,842 residents live in a Census Block that could expect to be impacted by a Category 1, 2, or 3 Hurricane. That is roughly 14% of the region's population.*
- *A two-foot sea level rise is projected for the region by 2050. Approximately 14% of the land area in the region will be affected by sea level rise and approximately 400 residents can expect to have sea level rise impact their homes.*
- *There are over 1,900 acres of impervious surfaces located within the 100-year Flood Zone, this is approximately 5% of the total area of the 100 – Year Flood Zone.*
- *There are approximately 1,050 acres of impervious surfaces located within the Category 1, 2, or 3 Hurricane Zone, this is approximately 10% of the total area (in acres) of the Category 1, 2, or 3 Hurricane Zone.*

ENDNOTES

1 https://www.fema.gov/pdf/areyouready/natural_hazards_1.pdf

2 https://www.fema.gov/glossary/flood-zones

3 Manage Flood Risk | Green Infrastructure | US EPA

4 https://rivercog.org/wp-content/uploads/2020/03/RiverCOG_Flood_Susceptibility_Report_July_25_2018.pdf

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18 https://rivercog.org/projects/natural-hazard-mitigation-plan/#:~:text=RiverCOG%20has%20updated%20its%20Natural%20Hazard%20Mitigation%20Plan,make%20our%20region%20more%20resilient%20to%20natural%20disasters.