Open Space Plan 2015-2021

Section 3
Community Setting

Community Setting

Section 3.1: REGIONAL CONTEXT

Physical Location

Geographical Location

Boston is in eastern Massachusetts along the coast of the Atlantic Ocean. It sits at latitude 42.3581° N and longitude 71.0636° W. The lowest point of the city is at sea level. The highest point is at Bellevue Hill in West Roxbury which is 325 feet above sea level. The city has 48.4 square miles of land (not including islands) and 41.2 square miles of water.

Municipal Boundaries

Boston is bounded on the north by Chelsea Creek, the Mystic River and the Charles River, and by the Town of Winthrop, the City of Revere, the City of Chelsea, the City of Everett, the City of Somerville, the City of Cambridge, and the Town of Watertown. It is bounded on the west by the Muddy River and the Charles River and by the City of Newton, the Town of Brookline, the Town of Needham, and the Town of Dedham. Boston is bounded on the south by the Neponset River and the Blue Hills, and by the Town of Milton and the City of Quincy. It is bounded on the east by Boston Harbor and Dorchester Bay, and the Boston Harbor Islands.

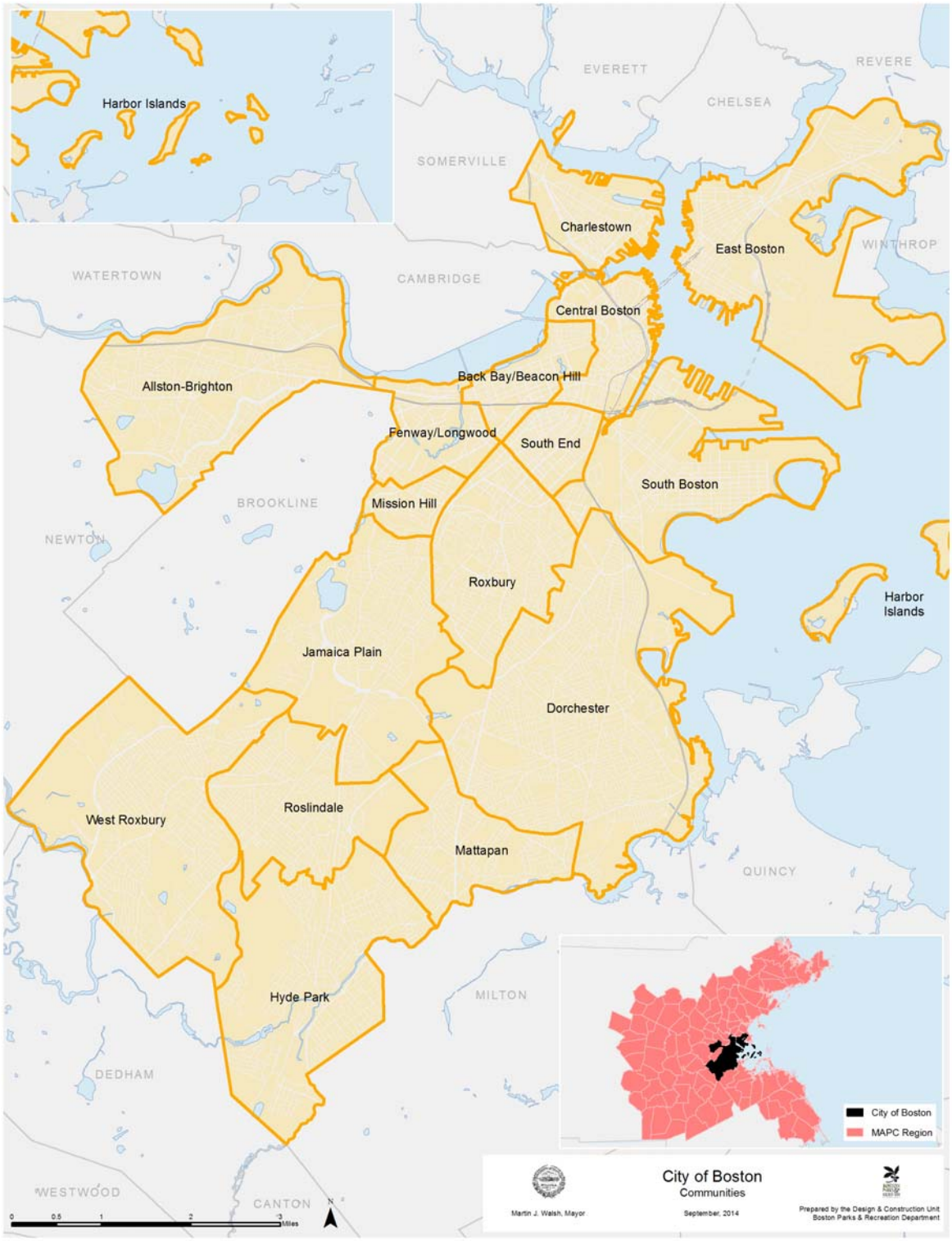
Neighborhoods of Boston

The City of Boston is the county seat of Suffolk County and the capitol of the Commonwealth of Massachusetts. The city incorporates 26 distinct neighborhoods, and the Boston Harbor Islands (and peninsulas). Many of these neighborhoods were once cities or towns that were annexed.

The Boston Redevelopment Authority recognizes the following neighborhoods as distinct planning districts: Allston, Back Bay, Bay Village, Beacon Hill, Brighton, Charlestown, Chinatown, Dorchester, Downtown, East Boston, Fenway, Harbor Islands, Hyde Park, Jamaica Plain, Leather District, Longwood Medical Area, Mattapan, Mission Hill, North End, Roslindale, Roxbury,

Community Setting

South Boston, South Boston Waterfront, South End, West End, and West Roxbury.



Map 1: Regional Context, and Communities within Boston

Community Setting

Boston Harbor Islands

The Boston Harbor Islands contain 34 islands ranging in size from less than 1 acre to 274 acres. Together, they total approximately 1,600 acres at high tide and 3,100 acres at low tide. The Boston Harbor Islands national park area extends 11 miles seaward from downtown Boston.

The islands and peninsulas in Boston Harbor and Dorchester Bay that are under the jurisdiction of the City of Boston include Calf Island, Deer Island, Gallop's Island, George's Island, Great Brewster Island, Green Island, Little Brewster Island, Little Calf Island, Long Island, Lovell's Island, Middle Brewster Island, Nixes Mate, Outer Brewster Island, Rainsford Island, Roaring Bulls, Shag Rocks, Spectacle Island, The Graves, and Thompson Island.

Watershed Address

Boston Harbor Watershed

Boston is located within the Boston Harbor Watershed which encompasses about 293 square miles of land, including all or part of 45 municipalities. This watershed includes the Mystic River Watershed to the north, the Charles River Watershed to the north and west, and the Neponset, Fore, Back, and Weir river watersheds to the south.

Boston is contained within the Mystic River Watershed, the Charles River Watershed, and the Neponset River Watershed. The Chelsea Creek flows along East Boston. Smaller watersheds in Boston include the Muddy River, Stony Brook and Mother Brook watersheds.

Chelsea Creek

Chelsea Creek (a.k.a. Chelsea River) is 2.6 miles long. It runs along Revere, Chelsea and East Boston and feeds part of the Belle Isle Marsh Reservation. The creek starts as Mill Creek in Revere, and flows east for .5 miles, then turns south where it becomes Chelsea Creek. It widens as it runs between Chelsea and East Boston, then turns southwest and runs into the Mystic River shortly before it empties into Boston Harbor.

Community Setting

Mystic River Watershed

The Mystic River Watershed covers 76 square miles and includes 21 municipalities. It begins north of Boston in Reading, then flows into the Upper Mystic Lake in Winchester, to Lower Mystic Lake, through Arlington, Somerville, Medford, Everett, Chelsea, Charlestown, East Boston and into Boston Harbor.

Charles River Watershed

The Charles River is 80 miles long and flows through 23 towns and cities southwest of Boston, beginning at Echo Lake in Hopkinton and ending in Boston Harbor. The river forms part of the southwest boundary of Boston, and also follows the north boundary of the city. The watershed comprises an area of 308 square miles and includes 35 towns and cities.

Neponset River Watershed

The Neponset River Watershed includes about 130 square miles of land southwest of Boston. The river starts in Foxboro near Gillette Stadium and runs for 30 miles, through 14 cities and towns. It forms the southern boundary of the Boston and ends in Dorchester Bay / Boston Harbor, near the landmark gas tank along I-93.

Impact of Location and Landform on Boston's Development

The 2006 *Massachusetts Statewide Comprehensive Outdoor Recreation Plan* describes the impact of location and landform of the development of the Boston Metro Region:

"This region comprises the Boston Basin, formed by the ring of highlands surrounding Boston Harbor and the urban core of the city. To the south are the prominent and historic Blue Hills, a rugged and ledge filled upland chain of ancient geologic age. To the west lie the Arlington Heights, and to the north, the Middlesex Fells Reservation incorporates another rim of the basin. While the Boston Basin extends outward of these highlands, to the north and west, based on bedrock geology and ecoregion definition, these features nonetheless help to define the region, so much so that Charles Elliot recognized them in his visionary plan. This plan, perhaps the first ecoregion plan, has become the cornerstone of the

Community Setting

DCR urban park system; its simple but insightful formula is to connect the hills, through the river corridors, to the sea.

The other correspondingly significant landscape features of this system are the several major rivers: the Charles, Neponset and Mystic. The force of these rivers, over geologic time, along with glaciation and weathering processes, have acted to produce the landscape that New England's "hub" now occupies. Because of the low gradient of the rivers, and the scraping action of the glaciers, the region is rich in wetlands, both salt and fresh, yet nearly devoid of lakes and ponds.

In contrast, the coastline itself is a profoundly important physical feature of this region, including such unique areas as the islands of Boston Harbor, the great peninsulas of Hull, Hough's Neck, Squantum, Winthrop's Deer Island, and Nahant. This deeply embayed and varied coastline encloses Massachusetts Bay, and through its outstanding scenic and recreation resources, along with its economic ones, acts as a powerful magnet to human population. This region is home to almost one-third (31%) of the state's total population. With this density of population, forest and agricultural resources are obviously more limited in area than in other parts of the state."

Boston has evolved through the centuries from an area of Native American encampment, to a coastal colonial outpost, to a major metropolis of global significance. The harbors, shoreline, tidal flats, lakes, ponds, marshes, and riverbanks have provided food and water, enabled transportation, encouraged trade, and influenced development throughout the history of this place.

Some 7,000 years ago, native peoples came to the area to fish and hunt. European settlers arrived and founded Boston in 1629. The landscape of steep hills and small valleys with ponds, streams, and rivers was amenable to early agriculture. This was a world of fishing and seafaring. The rivers carried the settlement inland.

This setting made possible a seaborne commerce that flourished with protected deep-water harbors. Early manufacturing utilized the waterpower of streams, rivers and tides. The terrain provided space for farmland, then suburban estates, and then streetcar suburbs as the population increased throughout the 19th century.

Community Setting

Many of the original land and water physical features have been greatly altered through the centuries. Boston's hills were used to fill wetlands; streams were covered over for housing and industry; the shoreline was pushed outward; military installations were built and buried on harbor islands and along coastal promontories; and an airport was built over islands and wetlands.

Economic Geography / Socio-Economic Context

Boston is the county seat of Suffolk County, and the capital of the Commonwealth of Massachusetts. It is the largest city in the state, and the largest city in New England. In 2010, Boston had a population of 617,594, making it the 22th largest city in the US by population. However, Boston has a land area of 48.4 square miles making it the second smallest major US city in terms of land area, after San Francisco. Boston has a population density of 19.94 persons per acre, which is greater than Chicago at 18.55 persons per acre.

MAPC defines Boston as a Metropolitan Core Community. These municipalities have a historic, high-density, urban character, with a range of housing from traditional triple-deckers and row houses to large multifamily buildings. New growth occurs mostly through redevelopment, infill, or conversion from industrial uses to residential or mixed uses. Minority, immigrant, and low-income populations comprise a large share of the population.

The city is the anchor of the Boston-Cambridge-Newton, MA-NH Metropolitan Statistical Area (MSA), which is the tenth-largest in the US, with a total population of approximately 4,640,802. The Boston-Worcester-Manchester/Nashua Combined Statistical Area is the fifth largest in the US with more than 7.6 million residents. This CSA represents the commuting region of Boston.

Boston is a global city that is among the most economically powerful cities in the world. Pricewaterhouse Cooper notes that the Greater Boston metro area has the sixth-largest economy in the country, and the twelfth-largest economy in the world[i] Richard Florida's *2011 Global Economic Power Index* ranked Boston as sixth in the world in terms of economic power, behind Tokyo, New York, London, Chicago, and Paris.[ii]

The *2013 Economy Report* by the BRA summarizes Boston:

Community Setting

"At the start of 2013, the overall demographic and economic health of Boston is strong. The City's population is growing, becoming increasingly diverse, and more educated. These population trends position Boston well for competing in the global knowledge economy. In terms of jobs, Boston appears to have weathered the most recent economic downturn well. While unemployment and job losses were issues here, the effects of the recent recession were not nearly as severe in Boston as they were throughout the US.

Over the last year Boston experienced significant job growth, Recent building permit data lends further support to the notion that the Boston economy is moving forward following the "Great Recession". Lastly, local employment projections suggest that Boston's leading industries are poised for strong growth over the next several years, particularly in Professional, Scientific and Technical Services and also Education and Health Care."

The *Boston by the Numbers* fact sheet (BRA, 2011) notes that the industrial composition of Boston has changed over the years. In general, Boston's economy has shifted more towards a knowledge and information based economy. Specialties in Boston include health care, education, financial, professional and business services, and hospitality and leisure. Wages have grown along with the evolution to a knowledge based economy.

The *Boston by the Numbers* fact sheet (BRA, 2011) notes that the total jobs in Boston in 2008 was 680,000. Boston has more jobs than residents and far more jobs that resident workers. Commuters from outside the city fill 62% of jobs.

The *2013 Economy Report* states that by 2016 the city could approach 730,000 jobs. Should this growth scenario play out as projected, 26.6 % of these jobs would be in health and education, 35.7% would be in financial, professional and business services, and 10.2% will be in the leisure and hospitality sector.

The *Largest Employers in the City of Boston* report (BRA, 2013) provides an overview of the largest private sector employers, defined as having 500 employees or more. The analysis revealed that there are 121 private sector companies in Boston with more than 500 employees. These companies account for 196,446 jobs.

Community Setting

Massachusetts General Hospital, Brigham and Women's Hospital and Boston University together provide more than 35,000 jobs.

Boston's largest employers are mainly providers of Health Care and Social Assistance, Finance and Insurance, and Educational Services. These three industries account for 144,070 jobs across 61 companies, representing 73% of all employment among Boston's largest employers.

However, not all business is big business in Boston. The BRA produced a report on *Boston's Neighborhood Business Patterns* (August 2014) that looks at each neighborhood in terms of the geographic distribution of jobs and business growth, major industries, jobs, largest employers, and other business characteristics. This document states that the majority of firms in Boston are small employers with almost half of the establishments having 1-4 workers. There are 8800 immigrant owned small business in Boston that generate almost $3.7 billion in annual sales and employ 18,500 people.

The *Boston by the Numbers* fact sheet (BRA, 2011) notes that the city is the location of 35 public and private colleges and universities. There are about 152,000 students at Boston's institutions of higher learning. Boston's colleges and universities employ over 42,600 people which is 6.5% of the jobs in the city. Student and student visitors spend approximately $1.7 billion annually in Boston. Currently, 54% of Boston's workers have a bachelor's degree. The combination of the large number of colleges and universities and skilled jobs results in a highly educated work force and a population that is relatively younger than other cities. The concentration of college students ranks at the top in the nation and the world.

The city is home to a number of technology companies and is a hub for biotechnology. In 2014, Boston institutions received $1.72 billion from the National Institutes of Health (NIH) – which was the highest funding to any city in the US for the 19th consecutive year.

Tourism forms a large part of the local economy. Boston's museums, orchestras, theaters, and performing and visual artists create a strong cultural dynamic in the city. The Greater Boston Convention and Visitors Bureau notes that there were 19,000,000

domestic and international visitors to Boston and Cambridge in 2013, who spent a total of $9.1 billion while visiting the area.

Boston is a state capital and county seat, and the home of federal, state, county and municipal agencies, law and government services which are another major component of the city's economy.

The city is a major seaport on the East Coast and the oldest continuously operated industrial and fishing port in the Western Hemisphere.

Effect of Economy on Open Space and Recreation Needs

Boston has evolved through the centuries from an area of Native American encampment, to a coastal colonial outpost, to a major metropolis of global significance. As economics and populations shifted, so too did the challenge to maintain and create adequate open spaces for the growing population. Economic downturns, political indifference, and dense population and heavy use have combined to deteriorate some of Boston's proudest green areas.

Industrial uses along the Charles and Neponset Rivers and other waterways left behind lingering pollution problems. Costly cleanup efforts are now beginning to alleviate these problems, thus enabling such areas to be used more extensively for water-based recreation.

Changes in the way the world does business had impacts on Boston. Railroad tracks were converted to the Massachusetts Turnpike. The noise and air pollution of trains were traded for those of cars and trucks, while the turnpike took more adjacent land for its right of way.

As seaport commerce declined, freight and passenger traffic at Logan International Airport increased, leading to more runways and other aviation facilities that spread across islands, tidal lands, and even a city park designed by Frederick Law Olmsted.

Several major waves of immigration impacted the city. The immigration during the Industrial Revolution of the late 19th and early 20th centuries resulted in densely populated neighborhoods where parks, playgrounds, and other forms of public open space

were important to populations with limited personal resources and time for recreation.

After World War II, the population declined as many families left the city for the suburbs, trading apartment blocks and triple-deckers for single-family homes separated by private yards and linked by wide, tree-lined streets. The population decline devastated several neighborhoods in Boston, leaving behind abandoned buildings and vacant lots as the legacy of the overcrowding generated by the streetcar suburb boom of the late 19th and early 20th centuries.

The reduction in population and the rise in abandoned buildings and vacant lots put pressure on municipal coffers. Pressure to reduce labor-intensive municipal functions grew and maintenance of parks became a significant target. City parks deteriorated during the 1960s and 1970s with the loss of constituents and reduced maintenance. In the 1980s, the passage of Proposition 2-1/2 capped the rate at which local property taxes could rise and further limited municipal revenues.

In the mid-1980s, open space activists formed a coalition of park advocacy groups to strengthen their voice in City Hall. With local philanthropists, they put together an effort to focus on the critical state of deterioration of the municipal and metropolitan parks.

The Greening of Boston was a landmark study that stimulated the city to develop a 1987 open space plan that outlined a program to rehabilitate the park system. The strong economy in the 1980s allowed the city to enjoy large increases in property taxes, which could fund the proposed multi-million dollar rehabilitation campaign.

As important as the rehabilitation of the park, was the recognition at the policy level that beautiful, safe, clean, and functional parks were needed to revitalize neighborhoods and stimulate private re-investment. Parks were seen as a key quality of life factor by which individuals and businesses assessed the value of a neighborhood.

Opportunities also arose during the period of decline of the city's natural resources. Boston currently has more than 180 community gardens that provide thousands of residents with a food source, sense of community, and outdoor exercise. Many of these gardens

were built on trash-strewn vacant lots. These sites transformed eyesores to attractive produce and flower gardens, increased neighborhood value, and became focuses of communities.

The current demand for development, the density of development and the geographic size of the City of Boston impact the protection of open space and put developable parcels at a premium.

Boston faces land use pressures from development demand. The infrastructure to support this development sustains the population but also encourages users who will tax the limits of the systems.

Land for any use is at a premium in Boston. Luxury apartments and office towers compete with parks and playgrounds for space in the dense urban environment. Achieving a balance of necessary development and services while maintaining Boston's quality of life requires a continuous push and pull of public policy – one in which open space, infrastructure and development complement and sometimes compete with each other.

Demands for development and the call for more green space are driven in part by continued migration into the city. Boston's population continues to grow, with newcomers from other lands, empty nesters moving back into the city, and young professionals attending college and staying to work after graduation.

Adjacent Land Uses and Shared Open Space Resources

Boston is linked with its regional neighbors by transportation infrastructure, commerce and education, and also by the larger regional system of open spaces and natural areas. The summary below of land uses in Boston and adjacent communities specifically notes natural and environmental resources that are shared between communities

The benefits and impacts of land uses between neighboring communities were determined through consultation of land use maps for the neighborhoods of Boston, and land use, zoning and open space maps for the municipalities adjacent to Boston.

Community Setting

City of Boston

Note: The City of Boston does not have a Master Plan. The Boston Redevelopment Authority (BRA) has produced a series of neighborhood land use maps that were consulted for this analysis.

Town of Winthrop

The Town of Winthrop's *2014 - 2021 Open Space and Recreation Plan* notes that the town has a layout that reflects its location as a peninsula and the influence of railroads. The town is made up of village and transit-oriented residential neighborhoods with a mix of single family homes, 2-4 family houses and mid-sized multifamily housing. New growth occurs through limited redevelopment and infill and expansion of existing structures. The *2005 Open Space Plan* noted that Winthrop has the lowest percentage of developable land in the metropolitan area.

The 2006 Town of Winthrop Street and Zoning Plan indicates a community of primarily residential development with several nodes of business districts interior to the peninsula. Large open spaces include Ingleside Park, Coughlin Park, Fisherman's Bend, Winthrop Shore Reservation, Yirrel Beach, the Winthrop Golf Club, and several cemeteries. The portion of Winthrop that faces East Boston across Belle Isle Inlet includes large conservation properties owned by DCR and the town including the Belle Isla Marsh Reservation, the Fort Banks Playground, and a cemetery.

The BRA's 2014 map of the *Neighborhood of East Bosto*n indicates that the portion of East Boston that faces Winthrop across Boston Harbor includes large open spaces of Belle Isle Marsh Reservation, Constitution Beach, and Wood Island Bay Marsh. The remainder of the property use closest to Winthrop is Logan Airport.

City of Revere

The City of Revere's *2010-2017 Open Space Plan* notes that the city covers 10 square miles. Of its entire area, 4.1 miles are open water and wetlands and not suitable for development. Of the 5.9 miles of developed land, 70% is used for housing. Revere is subject to extensive traffic each day as it serves as the "gateway" between downtown Boston and the North Shore. Approximately 1500 retail and service related businesses are located in Revere. Revere Beach

is three miles of uninterrupted crescent shaped beach, the first public beach in America.

The *2010 Zoning Map of Revere* indicates a largely residential community, with industrial uses to the north, and a commercial corridor along Route 107. Large conservation areas include the Rumney Marsh Reservation and the Revere Beach Reservation. The land use adjacent to East Boston is zoned for a Technology Enterprise District, and a Planned Development District. Two areas in Revere across the Belle Island Inlet and the Belle Isle Marsh Reservation in East Boston are city-owned open space. Suffolk Downs racetrack straddles the border of Revere and East Boston. At the time of this writing, the Mohegan Sun casino is proposed to be located on the Revere side of the site in close proximity to Belle Isle Marsh.

The BRA's 2014 map of the *Neighborhood of East Bosto*n indicates that the portion of East Boston that is adjacent to Revere includes the Belle Isle Marsh Reservation. The remainder of the land use in East Boston closest to Revere is primarily related to Suffolk Downs. A residential neighborhood lies near the boundary with Revere.

City of Chelsea

The City of Chelsea's *2010-2016 Open Space Plan* notes that the city is a highly urbanized, densely populated community with significant industrial uses. It is essentially built out with very little open land remaining. New development occurs largely through a process of redeveloping existing land. Chelsea plays an important role in providing access to a number of industries due to its proximity to the airport, Boston Harbor, and significant roadways. The Chelsea Creek waterfront is occupied by petroleum tank farms, a bulk salt storage area, airport-related trucking services, and parking for airport employees. Forbes Industrial Park comprises a group of older industrial buildings at the mouth of Mill Creek, which are currently under redevelopment for residential use.

The *2008 City of Chelsea Zoning Districts Map* indicates that the land that faces East Boston across the Chelsea River is zoned Waterfront Use, with Industrial Use behind. The portion of East Boston that faces Chelsea across the river primarily includes residential and open space uses. The portion of land that faces Charlestown across

the Mystic River is zoned for Waterfront uses, and Naval Hospital uses, with residential uses behind.

The BRA's 2013 map of the *Neighborhood of Charlestown* indicates that the portion of Charlestown that faces Chelsea across the Mystic River includes industrial waterfront uses.

City of Everett

The City of Everett's *2010-2017 Open Space Plan* notes that it is a fully developed inner core city in the Boston Metro area. Everett is roughly two thirds residential and one third industrial, with more than 50 acres of parks throughout. The Revere Beach Parkway / Route 16, is a heavily traveled road that divides the residential and industrial areas. Everett's Mystic River frontage is a Designated Port Area and is characterized by heavy industrial uses.

The *2003 Everett Waterfront Assessment* indicates that the waterfront across the Mystic River from Charlestown is Maritime Industrial use. The *2013 Proposed Zoning Map for the Proposed Lower Broadway Economic Development District and Resort Casino Overlay District* indicates that the land adjacent to the Alford Street Bridge is designated to be developed for Waterfront Mixed Use, Commercial, Employment and Residential uses. This is the site of the proposed Wynn Everett casino.

The BRA's 2013 map of the *Neighborhood of Charlestown* indicates that the portion of Charlestown that faces Everett across the Mystic River includes industrial waterfront uses. Ryan Playground is on the waterfront. The Alford Street Bridge connects Sullivan Square to Everett. The MBTA garage sits on the waterfront north of the bridge seawall. The currently planned realignment of the roads around Sullivan Square will free up seven parcels for redevelopment in the future.

City of Somerville

The City of Somerville's *2008-2013 Open Space Plan* notes that only a few significant parks were created before significant residential development at the turn of the 20th century. In the 1870s, two parcels were dedicated as permanent open space: Central Hill Park and Broadway Park. Private estates were mostly sold for

development, and only one tract of land was donated to the City for public use – Nathan Tufts Park in 1890.

Somerville is a largely residential community with 50% of the current housing stock dating between 1890 and 1910. By 1900, only 52 acres (4.7%) of Somerville's land were dedicated to parks or playgrounds. The City dedicated two parks during this time of rapid residential growth - Lincoln Park (1900) and Trum Field (1903). The rest of the City's parks, playgrounds, and open spaces were constructed with little master planning, and were fit into the residential subdivision of land. For this reason, many of Somerville's open spaces are less than a half-acre in size, and scattered throughout the city in an irregular pattern.

The *2010 City of Somerville Zoning Map* indicates that the boundary along Charlestown is divided into three uses: the upper portion along the Mystic River is the Assembly Square Mixed Use Area. The middle portion is residential. The lower third along boundary with Boston is industrial land with a business district.

The BRA's 2013 map of the *Neighborhood of Charlestown* indicates that the portion of Charlestown that abuts Somerville includes the MBTA Bus Barn which sits on the riverfront adjacent to Assembly Square. The middle portion of land along the boundary is residential use in the Sullivan Square area, against the same use in East Somerville. The southern portion of land along the boundary is commercial and industrial uses that abut the same type of land uses in Somerville.

City of Cambridge

The City of Cambridge's *2009-2016 Open Space Plan* notes that the city is a densely populated, urbanized area adjacent to a metropolitan downtown. The land uses in the city vary from low - density single - family neighborhoods, higher - density multifamily housing, institutions, mixed - use squares and commercial areas, former industrial areas that are evolving into high - tech employment centers, and a few large open spaces including Fresh Pond and the banks of the Charles River.

The Open Space Plan notes that an influx of residents in 1910-1930 prompted residential development, which resulted in the city becoming a series of interlocking street grids from east to west,

leaving virtually no undeveloped land remaining, and no great expanses of open space.

Cambridge is linked with its regional neighbors by transportation infrastructure, commerce and education, and also by the larger regional system of open spaces and natural areas. The most significant part of Cambridge's "green infrastructure" is the Charles River, which links it ecologically and recreationally with Boston and the Boston Harbor to the east, and with up - river communities.

The 2013 map of *Zoning Districts for Cambridge* indicates that the waterfront along the entire Charles River waterfront, across from Boston's Downtown, Back Bay and Allston/Brighton neighborhoods, is zoned as open space with primarily residential uses behind.

The BRA's 2013 map of the *Neighborhoods of Downtown*, 2013 map of the *Neighborhood of Back Bay*, 2014 map of the *Neighborhood of Fenway*, and 2012 map of the *Neighborhoods of Allston and Brighton* indicate the land uses along the Charles River across from Cambridge.

The length of this riverfront in Boston is predominantly open space of the Charles River Reservation. At the north end, institutional uses such as the Museum of Science lie within this landscape, while Mass General hospital is just beyond. Storrow Drive follows this landscape, with the residential uses of Beacon Hill beyond. The Boston Common and the Public Garden connect to the Commonwealth Mall, creating the start of the Emerald Necklace.

Continuing west, the residential uses of Back Bay abut the Charles River Esplanade. Institutional uses at Boston University and Harvard's Allston Campus are along the river. Soldier's Field Road follows the Charles River Reservation, across from Cambridge and Watertown.

Town of Watertown

The Town of Watertown's most recent Open Space Plan dated 2005-2010 was extended, and expired in October 2013. The *2013 Comprehensive Plan* notes that Watertown has more than four miles of frontage on the Charles River, and therefore strongly identifies

itself with the river which provides a natural setting that includes waterfront parks, trails, and recreational opportunities. The plan notes that this system of parks and open space has helped define the development pattern in the town, which is primarily residential with some industry.

The *2008 Zoning Map of Watertown* indicates that the land use across the Charles River from Boston is entirely green space. The Arsenal Mall, Perkins School for the Blind, and residential neighborhoods lie beyond.

The BRA's 2012 map of the *Neighborhoods of Allston and Brighton* indicates that the land use across the Charles River from Watertown includes commercial and industrial uses set into the green space along the Charles River Reservation.

City of Newton

The City of Newton's *Recreation and Open Space Plan Update 2013-2019* notes that Newton was one of the country's first railroad suburbs. Its location close to Boston, contributed to its density and Boston's economy created development pressures and escalated land values in Newton.

The increasing residential, commercial, and institutional development over the past century has led to increased traffic and the loss of open space. Newton's land area is nearly built out - less than 3% of the land area is undeveloped and unprotected.

Newton is a "Garden City" with portions that were designed and laid out by Frederick Law Olmsted and Alexander Wadsworth. Newton has established village centers, generally surrounded with a mix of single- and multi-family dwellings, with generous protected open space. A portion of the Charles River runs through the city.

The *2010 Zoning Map of Newton* and the *2012 Land Use Map of Newton* indicate that the land uses adjacent to Brighton are institutional (Boston College), residential, and open space. The BRA's 2012 map of the *Neighborhoods of Allston and Brighton* indicate that the land uses adjacent to Newton are primarily institutional (Boston College), residential, and the open space of the Chestnut Hill Reservoir and nearby open spaces such as Cassidy

Community Setting

Playground, Reilly Playground, Evergreen Cemetery, Saint John's Seminary, Chandler Pond, and The Cenacles.

The *2010 Zoning Map of Newton* and the *2012 Land Use Map of Newton* indicate that the land uses adjacent to West Roxbury are residential and open space. The BRA's 2012 map of the *Neighborhood of West Roxbury* indicates that the land use along the boundary of Newton is almost entirely open space, with a few areas of residential. This land includes Leatherbee Woods, Hancock Woods, Mount Benedict Cemetery, St. Joseph's Cemetery, Mount Lebanon Cemetery, Gethsemane Cemetery, Brook Farm, and Millennium Park.

Town of Brookline

The *2010 Open Space and Recreation Plan for the Town of Brookline* notes that the town was originally named Muddy River. It was settled in 1630 and incorporated as a town in 1705. At this time, the Charles River was tidal for nine miles upstream to Watertown, where a dam was built. There were mud flats in the Back Bay of Boston and between the Charles and Muddy Rivers. Extensive wetlands, ponds, and streams in Brookline were filled, drained or channeled through culverts into the 20th century. South Brookline was developed around extensive wetlands; wetland issues continue to be significant in this area.

In 1871, Brookline created the first public playing fields in the country, Cypress Field and Boylston Street Playground, and in 1885, built the first public pool. Many of the existing public parks and recreation areas were acquired by 1930. At present, just over 14% of Brookline's 4,355 acres of land is devoted to public parks, open space and recreational facilities.

In 1914, the Town's first Planning Board was established with Chairman Frederick Law Olmsted, Jr., co-author of the nation's first planning enabling legislation and son of the designer of the Emerald Necklace park system. In the past 40 years, the overall trend has been to reduce the amount of development allowed.

Community Setting

The *2008 Land Use Map for the Town of Brookline* indicates that the land use along the boundary with Brighton is predominantly multi-family residential and retail. The BRA's 2012 map of the *Neighborhoods of Allston and Brighton* indicate that the land use along the boundary with Brookline is predominantly single and multi-family residential.

The *2008 Land Use Map for the Town of Brookline* indicates that the land use along the boundary shared with Mission Hill is entirely open space of the Emerald Necklace. The BRA's *Map of Mission Hill* indicates that the land use along the boundary shared with Brookline is entirely made up of the Emerald Necklace, specifically the Riverway and Olmsted Park.

The *2008 Land Use Map for the Town of Brookline* indicates that the land uses along the boundary with Jamaica Plain are predominantly single family residential with some vacant land, religious affiliation use, municipal open space, educational, charities, nursing homes and hospitals, agricultural and recreation land, and multi-family uses.

The BRA's 2013 map of the *Neighborhood of Jamaica Plain* indicates that the land uses along the boundary shared with Brookline is largely the Emerald Necklace including Olmsted Park and Jamaica Pond, as well as the open space created by the privately owned Hellenic College. Some single family residential neighborhoods abut Brookline. Open space associated with the Showa Institute, Daughters of Saint Paul, Lawrence Farm and Allandale Woods is also along this boundary.

The *2008 Land Use Map for the Town of Brookline* indicates the uses along the boundary with West Roxbury include multi-family and municipal open space. The BRA's 2012 map of the *Neighborhood of West Roxbury* shows that the land use along the boundary of Brookline is residential with open space at Leatherbee Woods, Hancock Woods, and Mount Benedict Cemetery.

Town of Dedham

The Town of Dedham's *2010 Open Space and Recreation Plan* notes that Mother Brook, a man made canal, was constructed by 1640 to connect the Charles River to the Neponset River to provide power for a corn mill. In 1831, the Boston and Providence Railroad was

chartered and Dedham was included on the route. Dedham's natural landscape was changed with embankments, railroad cuts, massive quantities of fill, grade crossings, and new bridges.

The railroad station resulted in diversion of Dwight's Brook into a granite culvert, and swamps and bogs were filled in. Construction of Route 128 occurred in 1947-1956, which encouraged the location of technology companies. The consequent demand for residential land drove development to agricultural areas and wetlands. The uplands along Routes 1 and 128 were almost completely developed by the late 1970's. Strip malls and shopping centers along the main roads increased traffic problems. East Dedham underwent urban renewal and lost historic context.

The *2012 Zoning Map for the Town of Dedham* indicates that the land uses along the boundary with Boston are entirely residential uses. The Charles River follows the northern boundary between the municipalities.

The BRA's 2012 map of the *Neighborhood of West Roxbury* indicates that the land use along the boundary of Dedham includes the Charles River. Nearby open space includes Brook Farm and Millennium Park, public playgrounds, private cemeteries, and the nearby West Roxbury Quarry. The Stony Brook Reservation and the Mill Pond Reservation at Mother Brook are near the boundary with Dedham. The remaining land uses are residential along the West Roxbury and Hyde Park boundaries.

Town of Milton

The *2013 Town of Milton Master Plan* states that "Milton's open landscapes, grand estates and attractive residential neighborhoods are highly valued by community members. In visioning sessions, participants noted that rural and residential character are top priorities for preservation. In addition to Milton's distinctive homes, the expanse between homes, the pervasive tree canopy throughout town, the town's protected open spaces and the seamless integration of the New England style campuses are fundamental to Milton's identity and appeal."

The *2002 Town of Milton Zoning Districts* map indicates that the land uses along the Neponset River boundary with Boston are residential with two small business nodes at the northwest

boundary and the northeast boundary along the Neponset River Reservation. The Blue Hills Reservation is an open space of regional significance located along the southwest town border.

The BRA's 2014 map of the *Neighborhood of Hyde Park* indicates that the Neponset River Reservation straddles the southeast border with Milton. An area of single family residential use follows the river north, bordered by the Neponset River Reservation on the Boston side, and the West Street Urban Wild and Euclid Street Urban Wild. The large swath of green space in Boston continues with the Pope John Paul II Park, Cedar Grove Cemetery and Dorchester Park.

City of Quincy

The City of Quincy's *2012-2018 Open Space and Recreation Plan* indicates that Quincy has 27 miles of shoreline and contains several flowing bodies of water, including the Neponset River, Furnace Brook, Town Brook, Town River, and Black's Creek. These resources have made Quincy an excellent location for fisheries, shipbuilding, and marine transportation.

The landscape of Quincy has benefited and been harmed by its proximity to Boston. The city has been a desirable manufacturing location over time, but its proximity has also caused it to be affected by problems such as water pollution, sewage treatment issues, and public transit problems.

The beaches of Quincy Bay have long been impaired by their connection to Boston Harbor and the City's role in the Metropolitan Water Resource Area potable and waste water treatment systems. The primary waste water treatment plant on Nut Island was demolished after 100 years of discharges to Quincy Bay. In 1998, the Nut Island Headworks, a sewage screening facility, went into service. The ocean around Quincy and in Boston Harbor is remarkably cleaner and continues to improve.[iii]

The *City of Quincy Zoning Map* indicates that the land uses across the Neponset River from Boston predominantly include business development. The Blue Hills Reservation is an open space of regional significance which is located along the southwest town border. Significant open spaces are located along Boston Harbor.

Community Setting

The BRA's 2014 map of the *Neighborhood of Dorchester* indicates that green space is the predominant land use across the Neponset River from Quincy, including the Pope John Paul II Park, Garvey Playground and Tenean Beach. Savin Hill Beach, Malibu Beach and William T. Morrissey Boulevard are green spaces along Dorchester Bay at the tip of Quincy. Moon Island (owned by the City of Boston) is accessed from Quincy.

Open Space Plans of Neighboring Communities

The documents below were reviewed for this Open Space Plan, for potential park partners, programs, planning and projects.

Town of Winthrop

Winthrop's *2014 - 2021 Open Space and Recreation Plan* has the following goals, which include coordinating the Town's recreation and open space planning activities with neighboring communities.

1. Protect and enhance the quality and integrity of all conservation land and open space for public use and enjoyment.
2. Provide ample recreational opportunities for all residents.
3. Preserve the scenic quality of the town.
4. Promote public awareness of conservation and recreation, use of recreation areas and programs offered.
5. Coordinate Winthrop's recreation and open space planning activities with those of neighboring communities, as well as regional, state and federal activities.
6. Protect coastal areas.
7. Protect wildlife and wild plants to preserve the diversity and health of natural community ecosystems.
8. Promote cooperation between boards with jurisdiction over open space and recreational areas and work towards implementation.
9. Develop a walking and biking network linking public open space, and civic and commercial resources.[iv]

City of Revere

Revere's *2010-2017 Open Space Plan* has the following goals, which include developing partnerships and regional collaboration to maximize limited resources and develop regional open spaces.

Community Setting

1. Provide recreational opportunities for residents of all ages and abilities.
2. Protect and preserve Revere's natural resources.
3. Develop facilities and programs that promote fitness and health.
4. Improve stewardship of the parks.
5. Develop partnerships and engage in regional collaboration to maximize limited resources and develop regional open spaces.
6. Ensure that the plan includes environmental justice and equity.

City of Chelsea

Chelsea's *2010-2016 Open Space Plan* has the following goals:

1. Provide active and passive recreational and fitness opportunities suited to Chelsea's urban population. Provide a full range of recreational opportunities appropriate to citywide and neighborhood recreation needs and age groups.
2. Take advantage of Chelsea's environmental, historic, and scenic resources. New and existing parks should take advantage of opportunities to enrich the experience of residents.
3. Integrate the open space system into the city fabric. There is a relationship between open spaces and surrounding residential, commercial, and industrial areas. Open space should tie neighborhoods together, provide buffers against incompatible uses, and add value to surrounding properties.

City of Everett

Everett's *2010-2017 Open Space Plan* has the following goals, which include to establish community and regional partnerships.

1. Maintain, enhance, and maximize the utility and quality of recreation areas.
2. Establish community and regional partnerships to expand open space and recreational assets to residents and coordinate recreational programs to improve citizen participation.
3. Support Energize Everett , a city - wide wellness program.
4. Implement the recommendations of the *2003 Everett Waterfront Assessment* and the *Lower Mystic River Corridor Strategy*.

City of Somerville

Somerville's *2008-2013 Open Space Plan* has the following goals:

1. Renovate existing parks and open spaces to improve the condition of Somerville's recreational areas and ensure attractive, safe, and accessible public lands.
2. Acquire more land to expand Somerville's total open space acreage and ensure open space in every neighborhood.
3. Analyze and improve access for persons with disabilities to parks and open space, as part of ongoing ADA compliance.
4. Increase tree canopy and green spaces to improve urban health, promote sustainability, and reduce the heat-island effect.
5. Increase Off-Leash Recreational Area and skate boarding opportunities throughout the city, and create a new skate park.
6. Raise the bar for sustainable design and building practices in city parks and open space projects.
7. Reduce brownfields and convert to more desirable uses.
8. Improve accountability and set departmental vision through a series of strategic planning documents.

The 2011 *City of Somerville Comprehensive Plan Technical Report #5* notes that public and private open space constitutes approximately 6.75% of the total city land area. Of this, only 112 acres are protected in perpetuity. The report notes that Somerville residents have access to regional open space, the closest of which is primarily owned by the DCR.

City of Cambridge

Cambridge's *2009-2016 Open Space Plan* has the following goals:

1. Increase the amount of usable public open space in Cambridge.
2. Improve the quality and variety of parks and playgrounds.
3. Protect reservation and natural resources in the city.
4. Ensure that Cambridge's parks and open spaces are well-maintained, attractive, clean, and free of hazards and pests, and that park equipment and features remain in good repair.
5. Support a robust recreational program.
6. Work to improve the quality of streets and sidewalks in the city.
7. Increase trails and multiuse paths for pedestrians and bicycles.
8. Ensure that the public has information about the availability of different open space and recreational resources in the city.
9. Engage in planning initiatives that advance the creation, understanding and implementation of open space priorities.

Community Setting

Town of Watertown

Watertown's most recent Open Space Plan dated 2005-2010 was extended, and expired in October 2013. The open space goals in the Town's *2013 Comprehensive Plan* are as follows:

1. Identify opportunities to create new parks in underserved neighborhoods, while improving accessibility and the overall condition of Watertown's recreational resources.
2. Preserve, protect, and enhance publicly owned conservation, passive, and active open space.
3. Encourage private land owners to preserve open space.
4. Create new opportunities for recreational access along the Charles River.
5. Promote active and healthy lifestyles.

City of Newton

Newton's *Recreation and Open Space Plan 2013-19* has these goals:

1. To recognize, preserve, and maintain the City's important natural assets and resources.
2. To ensure an adequate amount, variety, and distribution of open space for both public benefit and biodiversity.
3. To integrate compatible recreation and conservation uses.
4. To explore the action necessary to protect and preserve large open spaces remaining, including the golf courses and other significant parcels owned by institutions and private entities.
5. To undergird the City's capacity for stewardship of its open space.

Town of Brookline

The *2010 Open Space and Recreation Plan for the Town of Brookline* includes a comprehensive set of goals and priorities. Most relevant to this Open Space Plan is the goal to encourage regional planning, including devising management strategies that address current environmental challenges including climate change and non-native invasive species.

A second goal that applies to Boston is to communicate with staff and/or environmental advocates in neighboring communities to form strategies to strengthen connections between green spaces.

Other categories include "resource protection" which includes goals for unprotected open space, green corridors, wetlands, watersheds, green infrastructure, habitat and wildlife, parks and recreation, and urban forests. The category of "meeting community goals" addresses recreation, education, outreach and advocacy, and financing of open space initiatives. The category of "creating management goals" includes goals to facilitate better municipal coordination, comply with storm water regulations, and create public-private partnerships.

Town of Dedham

Dedham's *2010 Open Space and Recreation Plan* notes that "Open space planning does not stop at a town's boundaries. Coordination with neighboring communities will be important for Dedham to achieve its Open Space and Recreation Goals and Objectives."

1. Protect the Town's biological diversity, watersheds and ecosystems.
2. Promote sound environmental management of open spaces.
3. Encourage development that protects open space systems and enhances natural resources.
4. Provide recreation facilities and programs that serve the Town's needs.
5. Provide universal access to recreation properties and programs.
6. Support Town efforts to protect and manage open space.
7. Coordinate and support protection of private open space.

One of the action items applicable to Boston's Open Space Plan is to coordinate with neighboring towns to create contiguous natural areas. Another action is to design a greenway system that connects open space and recreation lands and links to neighboring communities. Another action is to meet with neighboring towns to coordinate open space acquisition and management along the Town borders and waterways.

Town of Milton

Milton's *2013 Master Plan* has the following open space actions:

Natural and Cultural Resources - An inventory and assessment of the town's natural resources, their condition and functional significance. This element identifies particularly sensitive and "at-

risk" areas as well as potential or known sources of resource degradation that may warrant special attention. This element should identify and assess management and regulatory approaches to ensure that new development preserves natural resources to the extent possible and considers traditional development patterns and historic resources.

Open Space and Recreation - A quantitative and qualitative inventory of open space and recreational facilities that identifies strategies for advancing community open space and recreation goals. This element should identify the contributions of private open space to community character and quality of life and assess potential impacts of a reduction of this resource; and consider the impacts of shifts in demographics on the need for open space and recreation facilities and programs.

City of Quincy

Quincy's *2012-2018 Open Space and Recreation Plan* has these goals:

1. Identify funding sources for open and recreational spaces.
2. Identify and protect available and useful open space parcels.
3. Maintain and upgrade conservation lands, parks, and recreational facilities, including downtown pocket parks.
4. Encourage public access to waterfront areas.
5. Expand recreational opportunities to reflect Quincy's diversity.
6. Offer education on park resources and educational programs.
7. Make open and recreational spaces more accessible to people.
8. Investigating new recreational opportunities that reflect Quincy's diverse ethnic populations.

Regional Watershed Planning Efforts

Regional watershed planning efforts include those of the Boston Harbor Watershed, the Mystic River Watershed Association, the Charles River Watershed Association, and the Neponset River Watershed Association. The documents below were reviewed for applicability to this Open Space Plan, for potential park partners, programs, planning and projects.

Community Setting

Mass Bays Program

The Massachusetts Bays Program is a cooperative venture of the Massachusetts Executive Office of Energy and Environmental Affairs, the Massachusetts Office of Coastal Zone Management, and the U.S. Environmental Protection Agency. The Mass Bays Program for the Metro Boston Region has the following goals:

- Develop habitat specific restoration targets for Boston Harbor.
- Protect and restore eelgrass habitat.
- Restore degraded salt marsh and protect salt marsh habitat.
- Protect and restore diadromous fish habitat.
- Prepare for and understand the potential impacts to estuarine habitats from climate change.

The Massachusetts Bays Program completed the *Comprehensive Conservation and Management Plan* (CCMP) in 1996 and updated it in 2003. This plan includes steps to restore and protect the Massachusetts Bays ecosystem, and addresses the following areas that are potentially relevant to Boston's Open Space Plan:

- Protecting and Enhancing Coastal Habitat
- Enhancing Public Access and the Working Waterfront
- Planning for a Shifting Shoreline
- Managing Local Land Use and Growth

Boston Harbor Watershed

The *Boston Indicators Project* notes that the cleanup of Boston Harbor began in the mid-1980s in response to a law suit by the Conservation Law Foundation. It took more than a decade and almost $4 billion to complete. The Office of Water Policy at the Executive Office of Energy and Environmental Affairs lists the following priorities for the Boston Harbor Watershed:

- Expand watershed association, citizen monitoring programs, and the remediation/enforcement of water quality problems;
- Continue stream flow assessment and water supply planning in the Neponset and Weir River Watersheds and work to resolve flood control issues in the Mystic River Watershed;
- Evaluate current land use and the possibility of future development within the watershed;

- Restore sensitive habitat areas by managing dams to allow for fish passage, restoring wetlands, improving the health of the harbor, and controlling invasive species of aquatic plants; and
- Reduce/eliminate sewer overflows and extreme fecal coliform and nutrient levels.

Boston Harbor Watersheds 2004-2009 Action Plan

The *Boston Harbor Watersheds 2004-2009 Action Plan* includes the individual action plans for the Boston Inner Harbor Watershed, and the watersheds of the Neponset, Fore Back and Weir Rivers. The recommendations in the plan were intended to protect or restore the water quality, watershed hydrology and water supply, physical habitat and open space and outdoor recreation.

The document provided action plans specific to each watershed, as well as priorities common to all of the watersheds serving Boston Harbor: Sewer System Maintenance, Improvements, and Extensions; Stormwater Management and Groundwater Recharge; Septic Management; Management of Landscaped Areas; Water Supply and Stream flows; Riverine Habitat; Public Access to Waterways; Watershed Assessment; and Boating Initiatives.

Open space planning can influence many of the above priorities. However, the following recommendations are highlighted because of public access to waterways.

The *Boston Harbor Watersheds 2004-2009 Action Plan* notes that public access to navigable and potentially swimmable waters is limited in these watersheds. Public access along the shore is also very limited. Recommended actions for State and Municipal Governments related to open space include the following:

- Expand public walkways and parks on public and private property through Chapter 91 licensing and other incentives;
- Develop shoreline access plans at a parcel level of detail;
- Expand public amenities, handicapped access, and public programs in waterfront areas;
- Connect waterfront walkways to transit and other public lands;
- Prepare an inventory of potential boat launch and canoe launch sites and an action plan for their development;
- Expand the number of public boat ramps, canoe launching areas, water shuttles and other water-related activities; and

- Restore amenities and water quality at public beaches.

Greening Boston's Infrastructure

Boston Water and Sewer Commission (BWSC) was required to implement extensive remedial measures to minimize the discharge of sewage and other pollutants into the water bodies in and around Boston, as a result of a consent decree between the EPA and BWSC in 2005. This settlement has led to the incorporation of green infrastructure, low impact development, and other controls to help reduce discharges into the rivers and improve the health of Boston Harbor and its tributaries.

Chelsea Creek Vision Plan

This visioning for the *Chelsea Creek Vision Plan* included residents, public officials and business owners from East Boston, Chelsea and Revere. The plan envisioned restoring coastal resources, recreational uses, public access, and "clean" businesses. The plan included a continuous network of public access along the entire edge of the creek, including twelve parks that would create 7.5 miles of linear access. The plan also recommended the creation of a 1.5 mile interpretive greenway along the former Conrail/CSX freight line in East Boston and Revere that would extend from the East Boston Greenway to the Mill Creek open space. The plan was not adopted by any of the communities.

Chelsea Creek Waterfront Study and Plan

The 2005 *Chelsea Creek Waterfront Study* examined the development potential of key areas along Chelsea Creek and Mill Creek. The study found that the head of Chelsea Creek offers an opportunity to create a system of publicly accessible open spaces. The study concluded that public access should be a critical component of future planning efforts. The 2007 *Chelsea Creek Waterfront Plan* acknowledges that open space and public access to the creek are limited. One goal was to suggest public access linkages that do not conflict with water - dependent uses.

Mystic River Watershed Assessment and Action Plan

The Mystic River Watershed Association released the *Mystic River Assessment and Action Plan* in 2006 which looked at environmental

and recreational resources and preservation needs. Priorities relevant to the Boston Open Space Plan include:

3.1 Investigate opportunities to use the Blue Cities criteria developed by the Charles River Watershed Association for redevelopment that improves watershed functioning.
3.3 Develop consensus Smart Growth principles for projects in urban areas that consider the need to reclaim open space, repair inadequate sewer infrastructure, control flooding, and address traffic and other community concerns.
3.4 Support improvement of relevant municipal ordinances and zoning to promote smart growth. Catalog current municipal ordinances in the watershed. Compile model ordinances.
3.5 Develop a plan for parks and pedestrian/bike paths for the Lower Watershed that identifies all on-going waterfront redevelopment and planning, and identifies areas where coordination among plans would enhance the value.
3.7 Implement critical next steps from previous planning efforts.
3.9 Investigate options for improving public access in Designated Port Areas, consistent with regulations and security.
4.5 Continue efforts to complete key links in the pedestrian paths and bikeways throughout the watershed, in concert with regional efforts to enhance the network of paths. High priorities for action include the Bike to the Sea path, pedestrian and bike access through the MBTA property near Sullivan Square, the Chelsea Creek Riverway, the East Boston Greenway, extension of the paths along the Mystic River, the Charles River/Minuteman Connector, River and connecting to the Boston Harbor Walk through Charlestown.
4.7 Identify locations for improved public canoe and kayak access.

Mystic River Corridor Strategy

EPA New England gave the Mystic River a grade of D for water quality in 2007 because it met bacterial standards for swimming 52% of the time and boating standards 67% of the time. The EPA then began an initiative to improve the water quality in the Mystic River watershed.

The MAPC initiated the *Mystic River Corridor Strategy* in 2008, including the six cities along the Lower Mystic River. The vision is a waterfront that serves as a vibrant area for residents to use and enjoy. This vision will be achieved by improving existing open

space along the river, developing new open space, and connecting spaces via an active trail network. The *Mystic River Corridor Strategy* includes ideas relevant to Boston's Open Space Plan:

Strategy 1A: MAPC and the six cities will advocate for the completion of the open space system, with a focus on eleven high priority open space initiatives.

Strategy 3E: MAPC and the six cities will work to complete the gaps in the multi-use path system along the Mystic.
MAPC and the six cities will work to further multi-use path projects already identified in Strategy #1.
MAPC and the six cities will work with DCR to ensure that the Mystic River Master Plan and subsequent capital improvements will ensure a complete path system.

Strategy 4C2:MAPC and the six cities will work with DCR to expand its master plan to all land owned by DCR along the Mystic and its tributaries and to ensure that there is sufficient funding for capital improvements and maintenance activities.

The Lower Mystic River Corridor Strategy

The Lower Mystic River Corridor Strategy was prepared for the cities of Boston, Chelsea, Everett, Malden, Medford and Somerville by MAPC in 2009. The vision is that the waterfront serves as a vibrant area where residents live, work and play. This vision will be achieved through improving access to open space along the river, and connecting those spaces with a trail network that makes the river easily accessible by foot, bike, transit and water shuttles. The strategies from that plan that are relevant to the City of Boston's Open Space Plan are as follows:

Community Setting

Strategy #1: Acquire, protect, enhance and link regionally significant open space parcels [Note: The BRA did not identify any parcels for inclusion on this list due in part to the difficulties of implementing open space projects within the Designated Port Areas. Open space projects may be identified in the future as further work is done on the DPA]

- MAPC and the cities will work cooperatively to advocate for the completion of the open space system with a focus on the high priority open space initiatives listed in the plan.
- MAPC will work with the six cities to ensure that city open space plans fully address Mystic issues as identified in this strategy.

Strategy #2: Enhance and encourage sustainable development and redevelopment within the Corridor

A. Guide development to follow a unified set of principles
B. Advance sustainable development projects within the corridor
C. Explore development and open space opportunities in Designated Port Areas

Strategy #3: Improve access to and along the river through the development of water transportation, public transit, roadway improvements, and bicycle and pedestrian accommodations.

- MAPC and the six cities will work cooperatively to advocate for the completion of sixteen high priority transportation projects.
- MAPC and the six cities will work to support regional water transportation initiatives.
- MAPC will work with the cities and neighborhood groups to improve transit and pedestrian access to the Mystic River.
- MAPC and the six cities will continue to work with the Mystic Valley Active and Safe Transportation Network (Mystic VAST-NET) on action items that are complementary to the Corridor Strategy.
- MAPC and the six cities will work to complete the gaps in the multi-use path system along the Mystic River.

Mystic River Master Plan

The *Mystic River Master Plan* was completed by the DCR in 2009. The study area includes the Mystic River Reservation and

encompasses approximately 370 acres. The master plan focuses on improvements to the Mystic River Reservation, including creation of a connected trail system along its length. The plan sets the following goals:

- Restore river banks and edges to promote both increased recreational use and the river's ecological health.
- Develop a continuous multi-use pathway system along both banks of the Mystic River.
- Determine areas most suitable/desirable for recreation, education and preservation.
- Protect and enhance wildlife habitat by improving natural areas.
- Increase opportunities for water-related activities, including fishing and non-motorized boating.
- Strengthen the open space network with links to adjacent public open space and neighborhoods
- Develop guidelines for management and operation of park land.

Mystic River Active Transportation Initiative/2010 Active Transportation

Boston joined with Somerville, Chelsea, Everett, Malden and Medford, and the MAPC and DCR, as well as numerous non-profits, to create a coalition focused on active transportation along the Mystic River. Specific goals of the initiative include:

1. Create safe routes to transit and "Trails to Transit" programs.
2. Create a trail network for bicyclists along the lower river.
3. Improve waterfront access in order to support revitalization of adjoining neighborhoods and business areas.
4. Establish an urban river ring linking the Charles River, Alewife Brook and the Mystic River.
5. Connect to statewide and national trail systems.
6. Realization of health benefits of bicycle and pedestrian transportation within the Mystic River Communities.

Clean Charles River Initiative

The Charles River historically suffered from pollution due to sewage and industrial wastes. The *Clean Charles River Initiative* was launched in 1995 by the EPA in conjunction with federal, state and

local agencies, citizens, nonprofit groups and private institutions. It established the goal of making the lower Charles River "fishable" and "swimmable" from Watertown to Boston Harbor.

Since 1995, the initiative has achieved significant improvements in the water quality. In 1995, the river met boating standards 39 percent of the time, and swimming standards 19 percent of the time. In 2006, the lower Charles achieved boating standards 90 percent of the time, and swimming standards 62 percent of the time. This recovery is due to innovative storm water management and water-sensitive development.

In 2011, the Thiess International Riverprize was awarded to the Charles River Watershed Association for its management of the Charles River, now one of the cleanest urban waterways in the world. The $350,000 award is the most prestigious river prize in the world.

Neponset River Watershed Action Plan

The *Neponset River Watershed Action Plan* augments the *Common Action Plan for All Boston Harbor South Watersheds* in the *Boston Harbor Watersheds 2004-2009 Action Plan.* The actions are mainly about water quality. The issue of public access to waterways includes one action item for State Government that may have applicability to the City of Boston's Open Space Plan – that is the recommendation to develop a new open space needs and opportunities plan for the watershed as a whole.[v]

Regional Open Space Plans

Below is a review of Federal, State, Regional, and Municipal planning initiatives that inform the creation of the City of Boston's Open Space Plan. The documents were reviewed for applicability to this plan, with regard to potential park partners, programs, planning and projects.

America's Great Outdoors: A Promise to Future Generations (AGO)

The Obama Administration's *America's Great Outdoors: A Promise to Future Generations* (AGO) was produced in February 2011. Particularly applicable to Boston is a goal to "create and enhance a

new generation of safe, clean, accessible great urban parks and community green spaces."

Recommendation 6.1 Establish the Great Urban Parks and Community Green Spaces initiative by targeting increased funding for the National Park Service's Land and Water Conservation Fund to leverage investment in new and enhanced urban parks and community green spaces.

Action Item 6.1b Increase the number of urban parks and community green spaces by working with partners to develop criteria within the LWCF program for new urban parks and green spaces. Project criteria should include, but not be limited to:

- demonstrated need for and benefits of the project;
- alignment within a strategic conservation plan;
- partnerships, collaboration, leverage, and community support;
- demonstrated sustainability and stewardship of the project;
- demonstrated plan to provide for safe and accessible routes;
- maximized employment opportunities for young people that connect them to the outdoors;
- multiple benefits, such as ecosystem connectivity, flood control, economic revitalization, heritage tourism, and recreation;
- opportunities for outdoor education, and place-based learning.

State Comprehensive Outdoor Recreation Plan (SCORP)

The *State Comprehensive Outdoor Recreation Plan (SCORP)* presents the available recreational resources and needs in the state. It is prepared by the Executive Office of Energy and Environmental Affairs (EEA) and is used as a basis to distribute federal Land and Water Conservation Funds (LWCF) funding to projects that will fulfill the state's recreational needs.

The City of Boston must have a current Open Space Plan in order to be eligible to apply for LWCF funds through a competitive process. Eligible projects include the acquisition of conservation or recreation land, the development of a new park, or the renovation of an existing park.

When conservation or parkland receives LWCF funding, it is protected in perpetuity under Section 6(f)(3) of the LWCF Act and Article 97 of the Massachusetts State Constitution. This means that

the land cannot be converted to non - conservation or recreation use without the approval of the National Park Service (NPS) and the state legislature.

The NPS and the EEA also require that land be provided in compensation for the converted parcel. This is to ensure that the land remains a recreational resource to the public in perpetuity.

The AGO called for the guidelines for SCORPs to align with AGO priorities. A recommendation of the AGO was that more emphasis should be placed on developing or renovating spaces that are closer to where people live, work, and play. This is also a priority of the LWCF, and the 2012 SCORP.

The 2012 Massachusetts SCORP has the following goals that will meet the needs of residents and the goals of the federal AGO:

1. Increase the availability of all types of trails for recreation.
2. Increase the availability of water - based recreation.
3. Invest in recreation and conservation areas that are close to home.
4. Invest in racially, economically, and age diverse neighborhoods given their projected increase in participation in outdoor recreation.

Statewide Land Conservation Plan

The *Statewide Land Conservation Plan* was a comprehensive planning effort completed in 2002 that identified priority areas for conservation based on biodiversity, ecological habitat, water resources, working farms and forests, greenways and outdoor recreation sites, and urban parks. Now outdated, it forms the basis of plans that inform this document.

Areas of Environmental Concern

The Massachusetts Department of Conservation and Recreation (DCR) administers the *Areas of Environmental Concern* (ACEC) program in order to identify, inventory, and ensure stewardship of outstanding natural resource areas. The city of Boston contains portions of three ACECs – Rumney Marshes, Neponset Estuary, and Fowl Meadow/Ponkapoag Bog.

Community Setting

BioMap 2

BioMap 2: Conserving the Biodiversity of Massachusetts in a Changing World (2012) is a product of the Massachusetts Department of Fish and Game and The Nature Conservancy. It is intended to create a plan to protect the state's biodiversity in the context of climate change. Protection and stewardship of core habitat and critical natural landscape is essential to safeguard the diversity of species and their habitats, ecosystems, and resilient natural landscapes. In Boston, the Species of Conservation Concern, Priority and Exemplary Natural Communities are:

- Insects: Orange Sallow Moth
- Amphibians: Northern Leopard Frog , Blue - spotted Salamander
- Fishes: Threespine Stickleback
- Birds: Upland Sandpiper, Least Bittern, Black - crowned Night - heron, Snowy Egret, Common Tern, Least Tern, Barn Owl, Grasshopper Sparrow, Vesper Sparrow
- Plants: Long's Bulrush

The BioMap2 document identifies areas for protection of identified species. There are 2,341 acres of Core Habitat in Boston, of which 1,108 acres are protected. There are 540 acres of Critical Natural Landscape in Boston, of which 401 acres are protected. In broad terms, these areas include Stony Brook Reservation, the entirety of Logan Airport, and many of the Boston Harbor Islands.

Massachusetts Coastal and Estuarine Land Conservation Plan

The *Massachusetts Coastal and Estuarine Land Conservation Plan* was prepared in 2007 by the Massachusetts Office of Coastal Zone Management and its partners. This plan complies with federal requirements for funding for the protection of important coastal and estuarine areas that have significant conservation, recreation, ecological, historical, or aesthetic values, or that are threatened by conversion from their natural or recreational state to other uses.

Priority is given to lands that can be effectively managed and protected and that have significant ecological value. The following attributes were used to help identify priorities for Massachusetts:

- shoreline environments,
- coastline environments within a 2000-foot buffer of the shore,
- state identified "core habitats" for rare species,
- large relatively undisturbed natural habitats, and
- buffer zones along fresh surface waters and trails/greenways.

MassDOT's Capital Investment Plan for FY2014-FY2018

MassDOT's Capital Investment Plan for FY2014-FY2018 outlines how the state will spend about $12.4 billion over the next five years as investment in public transit, bike paths, paratransit, roads, bridges, airports and railroads. The plan seeks to fund investments that will enhance mobility, improve safety, stimulate economic growth and protect the environment. The plan acknowledges that the Big Dig crowded out most other projects outside of Boston. The plan recognizes that regional equity is critical, and improvements will be made that consider residents with no or limited access to public transit and decent roads. The specifics of this plan are discussed later in this section.

Commonwealth Connections

Commonwealth Connections (2002) is a greenway and conservation initiative of DCR, the National Park Service, and over fifty trail and land conservation agencies and non-profit organizations. The initiative was designed to create "a coordinated greenway and trail network that will help conserve important resources, provide recreation and alternative transportation opportunities close to where people live, and connect communities throughout Massachusetts."

The goals of the initiative specific to Boston include:

- protecting water quality, natural resources, and recreational opportunities along the Charles, Mystic, and Neponset Rivers;
- creating a network of interconnecting bicycle paths and trails through Boston and its suburbs;
- completing the Bay Circuit Trail;
- creating the HarborWalk and the East Boston Greenway;
- creating a multi-use greenway from Boston to the Berkshires along the route of the Massachusetts Central Rail Trail; and
- completing the Boston section of the East Coast Greenway.

Community Setting

Massachusetts Bicycle Transportation Plan

The *Massachusetts Bicycle Transportation Plan* was prepared for the Commonwealth of Massachusetts Executive Office of Transportation in September 2008. The plan seeks to improve conditions for bicycling in Massachusetts by identifying and prioritizing improvements to existing infrastructure and by promoting supportive policies.

Paths to a Sustainable Region

The Boston Region Metropolitan Planning Organization (MPO) created a long range transportation plan called *Paths to a Sustainable Region* to consider changes through 2035. This plan's "Vision for the Environment" is that human and environmental health is considered in transportation decision-making.

Environmental factors that the MPO reviews during its project selection process include Areas of Critical Environmental Concern, Wetlands, Water Supply Areas, Protected Open Space (levels of protection: perpetuity, limited, term-limited, and none) and Natural Heritage and Endangered Species Program Priority Habitats.

The transportation project design process is intended to avoid or minimize negative impacts to wetlands, soil, water, and other environmental resources. Context-sensitive design principles are to be implemented to protect communities' cultural, historic, and scenic resources, community cohesiveness, quality of life, and aesthetic environments. Transportation agencies will work with environmental and cultural resource agencies to achieve the following policies:

- Improve transportation in areas of existing development, which will reduce pressure to develop green fields.
- Protect community character and cultural resources.
- Protect natural resources by planning early to avoid or mitigate impacts on storm water or groundwater and on other resources.
- Protect public health by reducing air pollutants. Avoid funding projects that increase exposure of at-risk populations.
- Promote a context-sensitive design philosophy.

Community Setting

The Boston Region's Pedestrian Transportation Plan

MAPC's 2010 *Boston Region Pedestrian Transportation Plan* addresses the importance of walking, describes existing pedestrian infrastructure in the region, and recommends policies to facilitate walking as a convenient, practical and safe mode of transportation.

The specific action item regarding Greenways is relevant to this open space plan: "Communities should consider developing a mapped and signed pedestrian route system that combines sidewalks on low traffic streets, paths, and scenic or recreational facilities that makes these transportation corridors ideal for walking. Communities should work together to connect their respective walkways and pathways and strive to keep this type of pedestrian route system separate from vehicles."

Sustainable Development Principles

The Patrick Administration released a set of Sustainable Development Principles that guide the creation and implementation of state agency policies and programs, as well as investments in land and infrastructure. Municipalities are also asked to modify their planning, regulatory, and funding actions to achieve consistency with the principles.

Principle #4 is relevant to Boston's Open Space Plan: Protect Land and Ecosystems. Protect and restore environmentally sensitive lands, natural resources, agricultural lands, critical habitats, wetlands and water resources, and cultural and historic landscapes. Increase the quantity, quality and accessibility of open spaces and recreational opportunities.

Smart Growth Principles

The MAPC adopted Smart Growth Principles in 2003. Many of these principles are related to the provision of open space. The most specific are as follows:

- Promote distinctive, attractive communities with a strong sense of place
- Preserve open space, farmland and critical environmental resources.

- Take advantage of compact development design and create walkable neighborhoods.
- Promote economic development in ways that produce jobs, strengthen low and moderate income communicates and protect the natural environment.
- Promote more transportation choices through the appropriate development of land.

Metro North Land Use Priority Plan

The Metro North Land Use Priority Plan is a regional planning study that is currently underway. It is a collaboration of the Metropolitan Area Planning Council, the Executive Office of Housing and Economic Development, the Executive Office of Energy and Environmental Affairs, MassDOT, municipal officials, local planners, and local and regional stakeholders. It includes nine municipalities: Boston (East Boston and Charlestown), Chelsea, Everett, Malden, Medford, Melrose, Revere, Somerville, and Winthrop.

The plan will identify appropriate locations for open space, housing and job growth. It will recommend the infrastructure, zoning and permitting necessary to help advance the goals of the plan. MAPC worked with each community's staff to identify key locations that could meet these needs, and compiled a list of Regionally-Significant priority areas. The state agencies are currently in the process of determining which sites will make the list of state Priority Development Areas and Preservation Areas.

Metropolitan Area Planning Council (MAPC)

Boston is one of 101 municipalities that are served by the Metropolitan Area Planning Council (MAPC). The Metropolitan Area Planning Council (MAPC) is the regional land use planning agency for the Boston Metropolitan Planning Organization (MPO). MAPC provides a forum for state and local leaders to address issues of regional concern and collaborate in the development of comprehensive plans and recommendations in areas of population and employment, transportation, economic development, regional growth and the environment. MAPC works to achieve smart growth results through implementation of its land use plan, MetroFuture.

Community Setting

The Inner Core Committee

Boston is a member of the MAPC's Inner Core Committee (ICC), made up of high density cities of Boston , Cambridge, Somerville, Revere, Everett, and Chelsea as well as more residential streetcar suburbs inside Route 128. The ICC meets regularly to discuss matters of regional interest. Regional open space was discussed by the ICC on April 7, 2010.

MetroFuture

MetroFuture is the land use plan created by the MAPC in 2008 for Greater Boston. Below are the goals of the MetroFuture plan that are applicable to this Open Space Plan:

Goal 3. Brownfields and other polluted sites will be cleaned up and re-used for parks or development. Metro Boston is the location of 28 Superfund sites in Massachusetts. MetroFuture prioritizes the remediation of sites that pollute the environment and have negative impacts on neighboring real estate.

Goal 3 Objectives include the following:

- Existing 21E or Superfund sites will be remediated by 2020.
- New 21E or Superfund sites will be remediated within 10 years.

Goal 12. Communities will work together to plan for growth and share resources. A stronger regional identity will grow from increased communication and coordination across municipal boundaries. Through planning, joint services, and revenue sharing, cities and towns will be more efficient and protective of infrastructure and the environment.

Goal 12 Objectives include the following:

- The region will have an increasing number of inter-municipal planning efforts such as regional open space, economic development, public safety, or housing plans.

Goal 23. All neighborhoods will have access to safe and well-maintained parks, community gardens, and appropriate play spaces for children and youth. Even as density increases, MetroFuture will protect and enhance access to open space. The

region will…focus on areas currently underserved by open space and in compact growth areas. More residents will have access to nearby parks and community gardens, including seniors living in compact development in suburban town centers.

Goal 23 Objectives include the following:

- No more than 20% of the region's households will have limited access to open space (<50 acres per 1,000 people, at the TAZ level)
- The acreage of community gardens in urban areas will increase.
- Reported crimes in public parks will decrease.

Goal 25. Most residents will build regular physical activity into their daily lives. MetroFuture will enable residents to be more active, through clustered land use and improved bicycle and pedestrian connections. Complete sidewalk networks would allow more students to walk to nearby schools. The region would have completed 200 miles of off-road multi-use trails, and residents would use this network for commuting and recreation. Seniors who live in new housing near city and town centers will be able to stay active by walking to nearby shops and services.

Goal 25 Objectives include the following:

- All public and private schools will be accessible by sidewalk for children living within one mile.
- An increasing proportion of adults will have at least one 30-minute session of physical activity per week, across all Community Types.

Goal 62. The region's rivers, streams, lakes, and ponds will have sufficient clean water to support healthy populations of native fish and other species, as well as recreational uses.

Goal 62 Objectives include the following::

- Fewer of the region's waterways will be impaired due to pollution.
- 100% of combined sewer lines in the region will be separated and 100% of CSO outfall points will be closed.
- Stream flow levels measured by USGS gauges will be comparable to historical stream flow patterns.

- There will be zero violations of safe swimming standards in the region's rivers, lakes, and beaches.

Goal 63. The ecological condition of wetlands will improve, and fewer wetlands will be lost. The Metro Boston area has over 250,000 acres of wetlands, 32% of which contain rare or endangered species. Nearly 40% of the region's wetlands are not permanently protected.

Goal 63 Objectives include the following:

- There will be no net loss of wetland acreage.

Goal 64. The region will retain its biodiversity, and will have healthy populations of native plants and animals, and fewer invasive species. MetroFuture directs growth away from areas designated as "core" and "supporting" habitat for rare and endangered species. The region's open space network would allow for more movement of wildlife.

Goal 64 Objectives include the following:

- There will be no loss of core habitat for rare and endangered species.

Goal 65. A robust network of protected open spaces, farms, parks, and greenways will provide wildlife habitat, ecological benefits, recreational opportunities, and scenic beauty. Compact growth and more coordinated land acquisition would ensure that the region's important open spaces are not lost, and will be joined in a network. This will allow for corridors for animal use and migration, and recreation.

Goal 65 Objectives include the following:

- 139,000 acres of developable land identified as a high priority by the State Land Conservation Plan will be permanently protected.

Community Setting

The State of Equity in Metro Boston

The *State of Equity in Metro Boston* is the first in a series of indicator reports that will monitor the region's progress towards achieving goals set out by the MetroFuture plan. Equity-related goals are highlighted first, because meeting them is crucial to achieving a vibrant region.

The MetroFuture goals evaluated for the equity report include Goal #23: All neighborhoods will have adequate access to safe and well-maintained parks, community gardens, and appropriate play spaces for children and youth. This will help meet Goal #25: that the region's residents build more physical activity into their lives.

The State of Equity in Metro Boston notes that low quality or inadequate access to open space impacts the region negatively in terms of health care costs related to a lack of physical activity, increased driving to get to recreation areas, and disparities in property values, which are higher near recreational areas or open space vistas. Disparities in open space resources can also limit recreational options for residents. Areas with excellent open space acreage nearby are more likely to also offer diversity of open spaces, giving residents options of quiet parks, playgrounds, sports fields, community gardens, and more.

The State of Equity in Metro Boston notes that physical access to open space is not the only factor to consider when looking at a child's ability to play. Other factors include safety of the equipment in a playground, and of the neighborhood in which it is situated.

When local researchers found that neighborhoods with the highest concentrations of youth had the largest number of playgrounds, but offered the least safe playground equipment. Areas with higher concentrations of Black/African American residents, higher rates of youth poverty, and higher percentages of residents without high school degrees were also much more likely to have playgrounds with unsafe equipment than were areas with richer, Whiter, more highly educated populations.

Community Setting

Boston Complete Streets Initiative

The City of Boston has developed the *Complete Streets Initiative*, which requires that green infrastructure be incorporated into street designs. Green infrastructure includes greenscapes, such as trees, shrubs, grasses and other lands cape plantings, as well as rain gardens and vegetative swales, in filtration basins, and paving materials and permeable surfaces.

Mayor Walsh's Transition Team Report 2014

Mayor Martin J. Walsh's Energy, Environment, and Open Space Transition Committee discussed and solicited input from Boston residents, businesses and other interested groups.[vi]

A focus of the Transition Report was #2 Public Open Space: Protect and expand parks, beaches and other open space areas for recreation and enjoyment. The intent is to reinvent and restructure Boston's parks and open spaces for 21st century living by:

1. Making Boston a world leader in the quality, scope, and innovation of its public open spaces;
2. Utilizing all outdoor resources—city and state owned parks, bikeways, streets and sidewalks, playgrounds and schoolyards, transportation corridors, community gardens, plazas, vacant lots, green roofs, institutional and commercial open spaces, urban wilds, and the Harbor, HarborWalk, islands and public beaches in East Boston, South Boston, and Dorchester—to bring a wide range of outdoor opportunities and experiences to all Bostonians; and
3. Increasing investment in our parks and open space planning, programming, operations, and capital needs through all possible funding avenues.

The recommendations below are relevant to this Open Space Plan

Fully utilize the Mayor's existing tools to improve the quality of Boston parks and open spaces.

- Pass the Community Preservation Act.
- Simplify procedures for turning vacant DND and BRA (Boston Redevelopment Authority) lots into open space. The current system is unwieldy and non-transparent.

Community Setting

- Create a special Boston Public Schools schoolyard maintenance fund.
- Eliminate bureaucratic barriers to make it easier for park partners to bring resources, maintenance, and capital improvements to Boston's open spaces, parks and beaches.
- Make the 2014 Open Space Plan a specific, action-oriented document to drive future parks and open space creation and restoration.

Quick and Visible Improvements:

- Bring park permitting online.
- Focus park capital improvements in areas with high levels of income disparities and chronic disease.
- Recycling in Parks
- Promote Urban Farming.
- Make full use of City Hall Plaza to lessen the impact of big events on parks, especially the Boston Common and Franklin Park.

Ensure new open spaces will be built in the future: While development pressures are cyclical, recent experience demonstrates how quickly a neighborhood (e.g., the Seaport) can change in a boom economy. Immediate plans should be undertaken for:

a. The Waterfront: Commission a group of city planning and design experts, independent of the BRA, to recommend optimal open space and active recreational uses of the few remaining undeveloped waterfront parcels, especially in the Seaport, East Boston, North End, and the Harbor Islands, and to protect view corridors to the harbor in these areas.
b. Allston Projects: Harvard expansion and Mass. Pike relocation: Develop a comprehensive plan and implementation strategy, including government funding and Harvard's promised Public Realm Flexible Fund, for open spaces related to I-90 improvements and Harvard expansion (e.g., Rena Park, Smith Field, and the grove of trees at the Charlesview development site).
c. Fairmount Line Corridor: Plan new open spaces in Dorchester, Mattapan, and Hyde Park; host a competition to create outdoor "living rooms" as destinations for neighbors and transit riders.

4. Continue and accelerate major park and open space improvement projects, including but not limited to:

- The South Bay Harbor Trail: This project connects Roxbury with the waterfront which is 40% complete, with 100% of the design completed and all funds allocated.
- Muddy River Phase II: Advocate for continued full federal funding of Phase 2 of the Muddy River restoration project in the Fenway.
- East Boston Greenway: Complete the final section to Constitution Beach.

Invest a minimum of 1% of the city budget (currently at .7%) for parks and open space to properly fund operations, innovative planning, and capital projects.

- Make parks more livable. Install fountains in every park. Add lighting and play fountain where feasible. Build bathroom facilities in parks. Add bike racks.
- Community Gardens: Commit to support and expand gardens through Parks Department staff and funding. Hire a community garden liaison.
- Urban Wilds: Provide maintenance, capital and program resources to realize the potential of these unique areas.

Work with other levels of government to fully realize the potential of our new and existing large, signature parks, such as:

- Department of Conservation and Recreation parks
- Harbor Island Parks
- Rose Kennedy Greenway
- Charles River Underpasses

Tackle Big Ideas, Projects and Improvements:

- Uncover Charlesgate, the connection between the Emerald Necklace and the Esplanade.
- Keep building and add to linear parks like HarborWalk and the Neponset River Greenways.
- Hire dedicated park managers for the largest, most populous parks. Craft management plans for individual city parks.

Community Setting

Environmental Justice

Establish neighborhood green standards and report card: Create standards and scorecards to ensure equitable access for every neighborhood to green assets: gardens, parks, trees, bike paths, etc.

Boston Indicators Project

The Boston Indicators Project notes that the city is among the most vulnerable in the US to climate change and rising seas. Models of ice-free status in the Arctic by 2050 are being revised to project open seas in a decade. Projections are for a 7 foot rise in sea level in a century. The Northeast coast is at a disproportionate risk compared to other coasts in the nation and world.

Boston's Climate Plan

The City of Boston's 2007 Executive Order on Climate Action calls for the City to have a climate action plan that is updated every three years. The Climate Action Plan serves as Boston's blueprint for reaching its goals of reducing greenhouse gas emissions 25% by 2020 and 80% by 2050, and making sure the city is prepared for the impacts of climate change.

An update to the Climate Action Plan is currently being developed. This 2014 update will create a comprehensive climate preparedness plan, re-evaluate strategies, and measure progress.

Sparking the Climate Revolution 2010

Sparking Boston's Climate Revolution contains recommendations for reducing Boston's contribution to climate change, addressing the changes that cannot be avoided, and engaging the entire Boston community in the effort. The document states that Boston should continue to strengthen its existing programs for green stormwater management and infiltration, in particular by protecting and, wherever possible, expanding green infrastructure, including parks, urban wilds, wetlands, and green roofs, that can aid storm water management.

Community Setting

A Climate of Progress

In 2011, the City of Boston released *A Climate of Progress*, which called for meeting the goal of 25% reduction in greenhouse gas emission by 2020. The document calls for this Open Space Plan to include an explicit analysis of climate change risks and appropriate responses. It notes that the BPRD is concerned with the health of trees and urban ecosystems under its jurisdiction and calls for this Open Space Plan to include climate change considerations, including heat and rainfall patterns into the selection of tree species and other vegetation.

Stormwater Best Management Practices

The Boston Water and Sewer Commission produced the *Stormwater Best Management Practices (BMP) Proposal and Guidance Document* in January 2014. Relevant to this Open Space Plan, this document calls for Green Infrastructure that uses storm water runoff management practices to mimic the natural hydrologic cycle. Site planning includes reducing the amount of directly - connected impervious areas, fitting the proposed improvements to the site terrain, preserving and using the natural drainage systems, and replicating pre-development hydrology. The Commission is currently working on the implementation of demonstration projects at Audubon Circle (Beacon Street/Park Drive area), Central Square in East Boston, and City Hall Plaza.

Health of Boston Report 2012-2013

The *Health of Boston Report 2012-2013: A Neighborhood Focus* by the Boston Public Health Commission provides statistical data on select health conditions, risk behaviors, and social determinants of health for Boston. This report does not make recommendations, but does provide extensive information on health factors that should be consulted in creating policy and determining areas of need for the provision of parks.

This report does not look into open space and green space in depth. But it does note that one of the most important determinants of health is the physical environment in which one lives, works and plays. The report observes that resources that promote health are distributed unevenly across Boston, and follow patterns of racial segregation and poverty concentration. An inequitable distribution

of resources, together with residential segregation, results in people of color often living in neighborhoods where there is less access to conditions and opportunities that promote health - including open space and green space.

B*oston Public Health Commission Development Review Priorities*

The Boston Public Health Commission (BPHC) created development review priorities in 2013. These include the following objectives that are pertinent to this Open Space Plan.

- Ensure that all residents have access to public spaces. Include access to open and green space, parks and recreation facilities. Ensure equitable access to active and passive recreational spaces. Improving connections to public and open spaces improves equitable access to these resources. Children who live shorter distances to parks tend to be more active.

- Design parks, open spaces, and recreational facilities to complement the cultural preferences of the local population, to accommodate a range of activities and age groups and to support social connection. People of different ages have different health needs, and people from different backgrounds and ethnic groups have different physical activity preferences and attitudes toward nature. Involving people in the planning stages also gives them a sense of ownership in their park.

Regional Land Trusts

Boston is served by several large national, regional and citywide conservation organizations and land trust organizations, which work in partnership with smaller nonprofits. These are presented below:

Boston Natural Areas Network

The nonprofit Boston Natural Areas Network (BNAN) is one of Boston's largest land trusts. It is a city-wide nonprofit that owns, manages and protects more than 175 community gardens, owning 59 gardens and acting as an umbrella organization for smaller nonprofits. BNAN became a division of the Trustees of Reservations in 2006.

Community Setting

Trustees of Reservations

The Trustees of Reservations is the nation's oldest regional land trust. It is dedicated to preserving properties of scenic, historic, and ecological value in Massachusetts. The organization cares for more than 100 places statewide – nearly 25,000 acres though none were in Boston proper. The Trustees did not previously have property or roles in Boston, until affiliating with the Boston Natural Areas Network in 2006.

Trust for Public Land

The Trust for Public Land (TPL) has protected nearly 14,300 acres of land in Massachusetts since 1980. The land protection and enhancement efforts in Boston have included Harbor Islands, East Boston Greenway, playgrounds, community gardens, parks and rivers. TPL also releases an annual Park Score Index which rates the provision of parks in the 60 largest cities in the US. Boston tied for third place in 2013.

Resources of Regional Significance

There are approximately 333 parks, playgrounds, athletic fields, islands, urban wilds, and cemeteries in the inventory of the Boston Parks and Recreation Department. This totals approximately 2600 acres, of which 1000 acres form the Emerald Necklace designed by Frederick Law Olmsted.

In addition, open space resources of regional significance are owned by city agencies such as the Boston Redevelopment Authority, the Conservation Commission, Boston Public Works, and Boston Water and Sewer. State government agencies such as the Department of Conservation and Recreation, MasDOT, Massport, and MBTA also own significant open space and recreational resources in Boston. Federal agencies such as the National Park Service, Army Corp of Engineers, and the US Coast Guard own open space resources in Boston.

Boston includes many resources of regional attraction that are detailed later in this document. These resources are owned by the City, State, and institutions including the parks of the Emerald Necklace, the Charles River Reservation, the Neponset River Reservation, Stony Brook Reservation, the Arnold Arboretum, two

municipal golf courses, active and historic cemeteries, greenways, parkways, the Harbor Walk, urban coastal beaches, the Belle Isle Marsh, and the Boston Harbor Islands.

Some of the most extensive and significant regional scale open spaces in the metro region are found in the neighborhoods of Boston, and these resources are available to users beyond the City's boundaries. Many of the neighboring communities that are smaller in population lack the significant open space resources that can be found in Boston. It can be presumed that adjacent communities meet at least some recreational needs by making use of the regional facilities located in Boston.

Boston is a significant tourist destination, and this has an impact on the use of its environmental resources of regional significance.

Boston's boundaries are defined by resources of regional significance. The city is bounded on the north by Chelsea Creek, the Mystic River and the Charles River. It is bounded on the west by the Muddy River and the Charles River. Boston is bounded on the south by the Neponset River and the Blue Hills Reservation. It is bounded on the east by the coastline along Boston Harbor and Dorchester Bay, and the Harbor Islands beyond.

A list of resources of regional significance includes the following:

Coast: Inner Harbor, Boston Harbor, Dorchester Bay, Boston Harbor Islands and Peninsulas, coastal beaches, coastal parks, HarborWalk

Rivers and Streams: Chelsea Creek, Mystic River, Charles River, Muddy River, Neponset River, Mother Brook, Stony Brook, Bussey Brook

Waterbodies: Jamaica Pond, Chestnut Hill Reservoir, Chandler Pond, Scarborough Pond

Wetlands: Rumney Marshes (including Belle Isle Inlet Tidal Marsh), Neponset Estuary, Fowl Meadow/Ponkapoag Bog

Natural Landforms: Harbor Islands, Urban Wilds, Blue Hills Reservation which is 7000 acres located just outside of the Boston limits, parks which feature Roxbury Conglomerate (Roxbury

Puddingstone) such as Franklin Park, Allandale Woods, Hancock Woods, and Stony Brook Reservation

Historic Parks: the Emerald Necklace (including Boston Common, the Public Garden, Back Bay Fens, Jamaica Pond, Arnold Arboretum and Franklin Park), Faneuil Hall, historic parks of the South and North Ends

Cemeteries and Burying Grounds: Mount Hope Cemetery, Fairview Cemetery, Evergreen Cemetery, Bennington Street Burying Ground, Bunker Hill Burying Ground, Central Burying Ground, Copp's Hill, Dorchester North Burying Ground, Dorchester South Burying Ground, Eliot Burying Ground, Granary Burying Ground, Hawes/Union Burying Ground, King's Chapel, Market Street Burying Ground, Phipps Burying Ground, South End Burying Ground, Walter Street Burying Ground, Westerly Burying Ground

Golf Courses: George Wright Golf Course, William J. Devine Golf Course

State Parks: The State Department of Conservation and Recreation owns parks of regional significance in Boston such as Castle Island, Pleasure Bay, M Street Beach and Carson Beach, the Charles River Reservation, the Chestnut Hill Reservation, the Dorchester Shores Reservation, the Neponset River Reservation, Pope John Paul II Park Reservation, Roxbury Heritage State Park, Southwest Corridor Park, and the Stony Brook Reservation

Linear Parks and Greenways: Emerald Necklace, Charles River Reservation, Neponset River Reservation, Rose Kennedy Greenway, Southwest Corridor, East Boston Greenway

Parks on Landfills and Piers: Pope John Paul II Park, Millennium Park, Charlestown Naval Shipyard Park, Thomas Menino Park, Spectacle Island

Parkways: All or portions of scenic parkways under the jurisdiction of the Department of Conservation and Recreation such as the Arborway, Boylston Street, Centre Street, Charlesgate, the Fenway, Francis Parkman Drive, Gallivan Boulevard, Hyde Park Avenue, the Jamaicaway, Milton, Morton Street between Forest Hills Street and Gallivan Boulevard, Park Drive, Perkins Street, The Riverway and Willow Pond Road.

Community Setting

Greenbelt Protection Overlay Districts: GPODs zoned along all or part of Allandale Street, American Legion Highway, the Arborway, Centre Street, Chestnut Hill Avenue, Commonwealth Avenue, Dedham Parkway, Enneking Parkway, the Fenway/Park Drive, Forest Hills, the Jamaicaway, Leo M. Birmingham Parkway, Morrissey Boulevard, Morton Street, Nonantum Road, Perkins Street, Prince Street, the Riverway, Sigourney Street, Soldiers Field Road, South Street, Southwest Corridor, Turtle Pond Parkway, Walnut Street, Walter Street, West Roxbury Parkway, William J. Day Boulevard, and Veterans of Foreign Wars Parkway.

*Non Profits and Land Trusts:*Land trusts such as the Boston Natural Areas Network and other nonprofits own small scale open spaces in the form of community gardens and urban wilds, urban orchards and forests.

Non-protected open space: Institutions and private developers may include publically accessible, privately owned open spaces as community contributions in their institutional master plans and development plans that are reviewed through the Article 80 process at the Boston Redevelopment Authority. Though some are significant public spaces, these parks are not required to be protected in perpetuity at this time.

Protected Species: Portions of three Areas of Critical Environmental Concern are contained within Boston – Rumney Marshes, Neponset Estuary, and Fowl Meadow/Ponkapoag Bog. BioMap2 includes areas for protection of identified species which include Stony Brook Reservation, the entirety of Logan Airport and many of the Boston Harbor Islands.

Contiguous Open Space: There are areas within Boston that benefit from significant linear or clustered public and private open space in close proximity. Not all of this land is protected in perpetuity at this time, and priorities for protection should evaluate the unprotected lands on the list below:

- Allston: Charles River Reservation, Soldier's Field, Smith Playground, Harvard University athletic fields and open spaces.

- Brighton: Boston College Athletic Fields, Chestnut Hill Reservoir and nearby open spaces such as Cassidy Playground,

Reilly Playground, Evergreen Cemetery, Saint John's Seminary, Chandler Pond, Rogers Playground and The Cenacles.

- Jamaica Plain: Riverway, Olmsted Park, Jamaica Pond, Hellenic College, Showa Institute, Daughters of Saint Paul, Lawrence Farm, Allandale Woods, Joyce Kilmer Park, Arborway, Arnold Arboretum.

- Mattapan: Franklin Park, Forest Hills Cemetery, St. Michael's Cemetery, Mt. Hope Cemetery, Calvary Cemetery, Boston Nature Center, Boston State Hospital Urban Wild, Canterbury Urban Wild, Harambee Park, American Legion Highway

- West Roxbury: Leatherbee Woods, Hancock Woods, Mount Benedict Cemetery, St. Joseph's Cemetery, Mount Lebanon Cemetery, Gethsemane Cemetery, Brook Farm, Millennium Park, Charles River, Brook Farm, Millennium Park, and VFW Parkway.

- West Roxbury: West Roxbury Quarry, Centre Marsh Urban Wild, Roxbury Latin fields, Bellevue Hill Reservation, Stony Brook Reservation, George Wright Golf Course, Mill Pond Reservation, Fairview Quarry, Fairview Cemetery, Kelly Playground, Dooley Playground and Smith Pond Playground, West Roxbury Parkway and Neponset Valley Parkway.

- Hyde Park/Dorchester:Neponset River Reservation, West Street Urban Wild, Euclid Street Urban Wild, Pope John Paul II Park, Cedar Grove Cemetery and Dorchester Park.

- Dorchester: Neponset River Reservation, Pope John Paul II Park, Garvey Playground, Tenean Beach, Savin Hill Beach, Malibu Beach, UMass Harbor Walk, Old Harbor, William T. Morrissey Boulevard.

- South Boston: Columbus Park, Carson Beach, L Street Beach, M Street Beach, Marine Park, Castle Island

Shared Protection Strategies

The above review of watershed plans, regional open space documents and municipal open space plans suggests that

watershed and riverway planning has offered the best examples and greatest success of shared protection efforts. It appears that waterfront land uses may offer the greatest disparity between adjacent municipalities. There is little evidence of shared protection strategies for regional scale or shared open space, beyond the awareness of protection needs of rare species.

A review of municipal open space plans indicates that a goal of a number of neighboring communities is to form coalitions, communications and connections with neighbors on open space initiatives. There are opportunities for Boston and adjacent municipalities to work together on linear parks, green infrastructure, alternative transportation, social equity and climate change on a regional level and between adjacent municipalities. The opportunity exists for the City of Boston to be partners with its neighbors over shared resources and environmental issues that exist beyond the boundaries of the city.

Section 3.2: HISTORY

Boston's Environmental History

Boston is one of the oldest cities in the country. Its growth over the last 400 years, and its academia, culture and industry, have made it a world-class city and its socio and political history is well documented. The timeframe from colonization to present day is relatively well understood from an archeological perspective, because of the written records that exist, and the historical elements that can be found "above ground."

This section therefore focuses on the environmental history of the region from the prehistoric period through colonization. This is a timeframe for which limited written records exist, and most human artifacts are "below ground." Boston's natural landscape features, and preserved open spaces are therefore potentially valuable repositories of information about humans interaction with the environment during this early history.

Geological History

The *Historic and Archaeological Resources of the Boston Area* (Massachusetts Historical Commission, 1982) provides information on the geological history of Boston. The geology of this place provided landforms and resources that influenced its development.

A distinctive grain of bedrock runs northeast through Boston and follows the Appalachian tectonic plate. This grain is most obvious in the course of the Neponset River, in the angle of the bedrock Harbor Islands, and in the angle of cliffs of the Middlesex escarpment north of the city. This ancient fault system is active and Boston is subject to earthquake shocks.

The existence of ancient volcanos is evidenced in the granite outcrops to the north and west of the city. This rock was important to native populations for tool making, and was later quarried for local structures such as the Bunker Hill Monument and Quincy Market.

Community Setting

Much of Boston is located in a large lowland basin, which is underlain with blue clay and slate. Quarries in South Boston provided material for building foundations, roofing and gravestones for the early development of the city. Local clays were used to make pottery and bricks.

A conglomerate rock commonly known as Puddingstone is unique to the area, and gives Roxbury and Stony Brook their names. It can be found in Franklin Park and other parks throughout the city, that were likely created around rock formations that were difficult to remove or quarry. However, it was used as a building material in Roxbury, Brookline and throughout Boston, and also as a material for Victorian Gothic churches.

The Great Ice Age (Pleistocene Epoch) began to end around 10,000 BP as the glaciers and ice sheets that had covered North America for 1.8 million years retreated. As the glaciers melted, they changed the course of rivers like the Mystic, and created large bogs. Shallow kettle lakes formed throughout greater Boston, which later became important locations for natural ecology, prehistoric settlement, colonial country estates, ice harvesting, recreational areas and reservoirs for Boston's water supply.

The glacial retreat also formed the drumlin hills that shaped the landscape of Boston. Beacon Hill, Bunker Hill, and some of the Boston Harbor Islands remain as examples, though many of the gravel hills were removed during the filling of the wetlands.

Much of the glacial plain was flooded by sea level rise as the ice melted, so the amount of level, well-drained soil in Boston is limited. Early development was limited to these areas.

This is the landscape that nurtured the Native American populations for eons, and that greeted the first colonists when they arrived in the area.

Archeological History

The summary below is focused on the human history in the Boston area from the prehistoric period to the colonial, pre-revolutionary era. Because the archeological evidence of this period is mostly below ground, the natural landscape, and preserved open spaces of

the city are potentially valuable repositories of information on this time in history.

The City of Boston's Archaeologist, Joe Bagley notes that the open spaces of Boston have some of the greatest potential for the preservation of archaeological sites in Boston. Just over 300 archaeological sites have been identified in Boston, nearly evenly divided between Native and European people. The vast majority of these resources are located in open space including parks, undeveloped parcels, and formerly developed parcels that are no vacant.

Many of Boston's parks were former farm land which has left behind farm houses, mills, and other rural archaeological deposits in areas including Hancock Woods, Allandale Woods, and others. The undeveloped nature of Boston's parks make them highly sensitive for Native archaeological materials and many archaeological digs in Boston reveal some amounts of Native-made stone tools or pottery indicating the use of Boston before the arrival of Europeans was extensive.

Beside house and village sites, Boston's open spaces have already documented mills, factories, taverns, ship building docks, pottery-making kilns, artisan shops, prisons, cemeteries, churches, and many other historic resources that reveal important historic data about Boston's past only available through archaeological investigations. These archaeological resources are non-renewable and the historic data they record can only be property understood and recorded through professional archaeological survey.

The *Historic and Archaeological Resources of the Boston Area* notes that the prehistoric archeological sites that survive in the Boston area are generally special purpose sites such as shell middens on islands, quarries used for tool making particularly in the Blue Hill area, and rock shelters found especially in reservations and park areas. The Boylston Street Fish Weir, a shell midden at Quincy Market, and sites found at the Arnold Arboretum, Boston Common, the Neponset and Mystic River estuaries, and on several of the Harbor Islands suggest the value of further research on many of the city's open spaces.

Prehistoric Era (12,000 – 400 BP)

Community Setting

Joe Bagley, the City of Boston's Archaeologist, notes that the human history of Boston begins approximately 12,000 years ago when the first known Native People entered the region. The environment that they would have met would have been far different from that of today.

The glaciers that once covered the area to a depth of nearly one mile still retained vast quantities of water, resulting in a sea level nearly 250 feet lower than current. Boston's shoreline would have extended nearly 10 miles east of its current location due to these lower sea levels, and the overall cold environment and lack of soil due to glacial erosion resulted in a tundra-like environment with low shrubs, mosses, and few trees.

Within this environment entered the first Native People, who hunted large animals such as mastodon on caribou supplemented with fish and birds. This highly-nomadic people settled on raised hills overlooking low-lying marshes and plains where animals congregated. To date, no sites from this earliest period have been located in Boston, though their presence in Watertown, Saugus, Canton, and Ipswich implies their presence in Boston also.

The *Historic and Archaeological Resources of the Boston Area* (MHC, 1982) states that projectile points have been found in the Boston area dating to the Paleoindian Era (12,000 – 9,000 Before Present). These items were found on terraces over the Mystic River and the Charles River, which would have been further inland when the sea level was lower. Other Paleoindian sites may have been drowned by sea level rise.

About 10,000 years ago, the development of forests and the establishment of the major rivers in Boston; the Charles, Neponset, and Mystic, allowed Native People to begin establishing seasonal camp sites at the location of raw resources such as wild berries, hunting areas, and stone outcrops that could provide the raw materials for tools.

The *Historic and Archaeological Resources of the Boston Area* notes that greater evidence of the Archaic Period has been found at multiple sites in the Boston area. From 10,000-3,000 years ago populations increased resulting in a dramatic increase in numbers of archaeological sites identified during this period in open spaces

including Boston Common, the Arnold Arboretum, and the Harbor Islands.

The City of Boston's Archaeologist notes that during this period, the area that would become Back Bay saw the invention and use of a massive fish weir system, between 3,600 and 5,200 years ago. This extensive network of stick fences allowed for the capture of fish spawning in the Charles during the spring. To date, these weirs, perfectly preserved under about 30 feet of fill and clay under Back Bay, have been encountered nearly a dozen times during construction projects and are one of the largest Native American constructed environments known in the US.

The City of Boston's Archaeologist notes that around 3,000 years ago, there were two major events that occurred in Boston's environmental history. The first was the flooding of Boston Harbor. Up to this point, the Harbor was a hilly plain similar to Jamaica Plain and Roxbury, today. As sea levels reached the edge of today's harbor, the waters quickly transformed the area into a shallow harbor filled with islands. The clams and oysters that quickly moved into the warm harbor provided a reliable food source that resulted in numerous shell-rich camp sites along the shoreline and Harbor Islands where Natives gathered to eat clams and other foods for nearly 3,000 years before the arrival of Europeans.

The second major development 3,000 years ago was the adoption of pottery and agriculture, which quickly transformed the Native population from a people who traveled as groups to various resource areas throughout the year, to more formally established villages in places like Charlestown, downtown Boston, and the Lower Mills area of Dorchester. These villages contained the populations of Native People who were encountered by Europeans when they first began exploring and settling what would become Boston in the early 1600s.

The *Historic and Archaeological Resources of the Boston Area* notes that the sites from the Woodland Period (2,000-400 Before Present) are less numerous than earlier eras. The report considers that this might be due to a change of lifeways which included a switch to horticulture. Evidence of life near the coastal fringe and lower elevations may have been destroyed or are no longer readily accessible today.

Community Setting

Contact Period (1500-1620 AD)

The Native American pattern of coastal settlement probably intensified during the Contact Period because the presence of Europeans provided opportunity for trade. However, newly introduced infectious diseases devastated the native population. Captain John Smith arrived in 1614. By 1618, disease brought by the European traders had decimated the population. Cultural disorganization was the result, but the survivors likely continued to cluster along the river estuaries and the coast.

The Historic and Archaeological Resources of the Boston Area states that there are three major groups of survivals from the Contact Period – archeological sites, landscape features and native place names. The early and continuous development, and changes of the landforms of Boston, has resulted in the destruction of ancient sites. However, some sites may have been buried and therefore preserved by the extensive filling. Sites may have also survived in parklands, as well as backyards, under parking lots and even under structures.

Landscape features such as native trails, fords or fish weirs are evidence of the alteration of the landscape. These features are often preserved through use. The native trail system related to topography, or provided access to tidal flats or other coastal resources, and may still be evident in places. Native ford sites are often the site of major bridge locations.

The final category is place names, which are phonetic transcriptions recorded by early settlers. This is difficult to track, because of phonetics, truncation, and shifting places. But names like Neponset, Mystic, and Mattapan provide clues to places that mattered to native populations. For example, the native people called the peninsula on which they settled “Shawmut” which means "land of many waters.” Shawmut Street today is very close to the native trail that led to the mainland.

Plantation Period (1620-1675 AD)

The Historic and Archaeological Resources of the Boston Area notes that this period is defined by the establishment of permanent English settlement along the coast, and expansion inland along major tidal rivers. The Great migration of English immigrants occurred during

the 1630s. The initial European settlements of coastal trading posts and plantations clustered with the native population around the Mystic and Neponset estuary / Quincy Bay. With the establishment of formal towns by 1630, the Charles River estuary became an area of new settlement.

This period is also characterized by the virtual removal of the native population from the Boston area. By the end of the 17th century, the remnants of the native population had left the coastal lowlands under pressure from the English colony and retreated to upland sites such as the Blue Hills. However, most moved west and north of Boston.

The *Historic and Archaeological Resources of the Boston Area* notes that the archeological survivals from the Plantation Period include archeological remains, landscape features and structures. Development has destroyed most evidence of the Plantation Period, so any survivals should be considered priority for preservation. The Areas of Boston proper, Charlestown, Dorchester and Roxbury are considered important potential areas for survivals of this period to occur.

Archeological remains include Native American sites and the range of European colonial sites (residential, industrial mills and foundries and commercial). Site potential is likely in areas that were original town centers such as Town Cove in Boston. Two kinds of areas are important to consider as the sites of industry, farms or native American sites – Surviving open spaces such as Boston Common. Second are areas where the ground level has been built up by filling, which would preserve the underlying layers. Filling was often done along estuaries and original coastlines with should be considered to be particularly sensitive.

Landscape features include period roads, field division lines, boundary markers, town plans, burial grounds and any other alteration of the landscape that was made during the period. Surviving place names for places of landscape features are also indicators of where landscape survivals may be found.

Community Setting

Colonial Period (1675-1775 AD)

Boston emerged as a city during the Colonial Period. The Charles River continued to grow as the regional focus. Settlement followed a pattern of infill and consolidation of the previously developed areas. Small villages developed around a crossroads or mill, or farms clustered where soil was good. Boston and Charlestown were the heart of the area. Roxbury, Jamaica Plan and areas along the Mystic River became fashionable for country estates in the early 1700s. Several of the Harbor Islands were used for grazing, fishing and institutional purposes.

The survivals of this period are most likely archeological remains, landscape features, rural landscapes, town/urban streetscapes, and individual structures. Particularly sensitive areas include the Boston urban core, town centers, mill or industrial sites, and filled land. Landscape features include roads and features of town plans, farms, fields and fences and clusters of period houses. Streetscapes include clusters of structures, roads, burying grounds and other features. Areas of significant potential include Boston Proper, Roxbury, and Charlestown.

Early Settlement Patterns

Prehistoric Era (12,000 – 400 BC)

There is little evidence of human settlement from this early period due to seasonal movement, the tendency to locate within estuaries, the use of organic building materials, the consequent human development that may have eradicated these sites, and changes in land forms and sea level rise.

The Paleo Indian Period (12,000-10,000 BP) saw the earliest use of the Boston area by groups of nomadic hunters following migrating herds of large game. The former shoreline of the ocean, now under Boston Harbor, would have been heavily used during this time.

The Archaic Period (10,000-3,000 BP) saw an increase in populations and use of many areas of Boston. The Woodland Period (3,000-400 BP) saw the stabilization of the overall climate of Boston as well as the formalization of settlements in villages at river confluences and outlets in Boston. These settlements allowed for the growth of agriculture and the use of pottery, both of which

would have been impractical during earlier seasonal movement of people in the past.

Contact Period (1500-1620 AD)

The *Historic and Archaeological Resources of the Boston Area* notes that no Native People settlements have been archeologically documented in Boston, only burial sites. However, it is likely that the native populations settled along the Neponset and Mystic River estuaries, and the adjacent Harbor Islands in the spring and fall. These would have been important places for gathering of food, social, political and economic reasons.

During the summer and winter months, the native population would likely have dispersed to smaller sites of upland tributaries and ponds (beyond the limits of present Boston) for the greater protection from storms and the opportunity for ice fishing and hunting. Peripheral encampments would have included hunting camps, stations near quarries for tool making and rock shelters used during travel.

The *Historic and Archaeological Resources of the Boston Area* notes that there is evidence that the Charles River had a native presence, but it appears to have served more as a boundary than a gathering place. The report suggest that more research is needed to confirm this thesis.

The major event of the period was European contact with the native population and this contact affected and altered native culture throughout the period. The presence of Europeans along the coast probably intensified the native population's pattern of coastal oriented settlement, but did not change its basic pattern of seasonal movement. The epidemics of the late 16th and early 17th-century decimated the native population and eliminated the social structures of the native groups. However, the survivors continued to follow the same patterns.

The primary transportation system during the Contact Period was a complex network of trails that followed the natural contours of the landscape, changed elevation at an easy grade, and favored the sunny rather than shady slope. The trail network provided alternative routes for crossing the landscape. Examples of native

trails include Shawmut in Boston, Mishawam in Charlestown and Mattapanock in South Boston.

Fords were located where the trails crossed large rivers, usually at the first fall line such as on the Charles at Watertown Square and the Neponset at Lower Mills. Archeological evidence from the Harbor Islands indicates that water transport was also used.

Plantation Period (1620-1675)

The Historic and Archaeological Resources of the Boston Area notes that this period is defined by the establishment of permanent English settlement along the coast, and expansion inland along major tidal rivers. The initial European settlements were coastal trading posts and plantations clustered with the native population around the Mystic River and Neponset estuary / Quincy Bay. With the establishment of towns by 1630, the Charles River estuary became an area of new settlement.

Boston quickly became the seat of provincial government, and development along the Charles River became the primary center of the region. The development along the Neponset River became more focused on agriculture, ironmaking and ship building. The development along the Mystic River focused on shipbuilding and agriculture.

This period is also characterized by the virtual elimination of the native population from the Boston area. By the end of the 17th century, the remnants of the native population had left the coastal lowlands under pressure from the English colony and retreated to upland sites such as the Blue Hills. However, most moved west and north of Boston.

The colonists used the native trail system to get around difficult terrain, and improved ford sites with bridges. Planned towns such as Charlestown had street grids. Rangeways that were long, straight roads that ignored changes in topography were added to the trail network.

Water transportation linked the colonists to the England, and to destinations up and down New England such as Salem and Portsmouth, Plymouth and Newport, the East Coast and the Caribbean.

There were two types of settlement patterns in this era – the planned town and the organic village. Charlestown is the only planned town within the Boston limits, and is characterized by a regular street grid and formal market squares (Harvard Square in Cambridge is another local example). Partial attempts at formal street plans were made in Boston.

The most common type of settlement pattern was the organic village which was usually located at the intersection of existing native trails, and centered on a meetinghouse and burying ground, perhaps with a tavern and common ground. Early examples exist in Dorchester and Roxbury.

By the mid-1600s, most towns consisted of a small meeting house center with individual farms set in a grid of divided fields. Boston had developed in a more intense pattern by this time, with an urban density evidenced by separate residential and commercial districts.

Colonial Period (1675-1775)

Boston emerged as a city during the Colonial Period. The Charles River continued to grow as the regional focus. Boston and Charlestown were at the heart of this area. There was a greater emphasis on the interior portion of Boston, and less interest in new settlements along the coast.

Early colonial settlement in Boston focused on many of the areas previously occupied by native villages including Charlestown, downtown Boston, and Savin Hill Dorchester. Many of these areas are still heavily used by residents today. Boston was one of the most important port cities in the Atlantic world.

Settlement followed a pattern of infill and consolidation of the areas that had been settled during the Plantation Period. Small villages developed around a crossroads or mill, or farms clustered where soil was good. Roxbury, Jamaica Plan and areas along the Mystic River became fashionable for country estates in the early 1700s. Several of the Harbor Islands were used for grazing, fishing and institutional purposes.

Community Setting

The water transport system, particularly to Portsmouth, Salem and Plymouth grew. It was often easier to get to a local destination by boat than by road, and a myriad of wharfs served the small shallop boats that were commonly used. The same corridors of enhanced native trails connected Boston to adjacent areas, and development focused along these routes. Many of these routes terminated in Roxbury, as Boston proper remained isolated on a peninsula. Roxbury controlled the access to Boston proper along the neck of the peninsula.

Boston proper had an increase in population and commercial activity that led to distinct social and economic districts. The main residential areas were in the North End and the Old South End and were three story brick and wood houses on narrow lots. Three and four story brick building along Corn Hill (Washington) Street were the civic and commercial heart of the city. The area from Town Cove to the North End and Fort Hill was a district of wharves and shipyards, much of it built on filled land.

During this period, Boston would drop from the largest city in British North America, to the third behind New York and Philadelphia due to its location on a peninsula which limited its growth.

Federal Period (1775-1830)

Boston saw a dramatic increase in population and prominence during the Federal Period, establishing itself as a major source of goods and supplies including ships, lumber, cod, and other material goods while also being a major port for the arrival of goods from afar making Boston a cosmopolitan city.

This period would mark the beginning of the land reclamation that would expand the land mass of Boston. The topography would be reshaped through cutting of hills and filling of waterways , and new bridges, canals, and causeways would be built. Granite quarries would be dug.

The *Historic and Archeological Resources of the Boston Area* notes that during the Federal Period, Boston reached the physical limits of its shoreline. One solution was that the core city began to develop more density. It also expanded outward and absorbed adjacent communities.

Community Setting

Toll bridges on causeways; turnpikes and omnibus service (horse drawn carriage) encouraged residential development beyond the urban core. The third solution was to expand the lad mass, a process which began in earnest during this period as hills were cut down and used to fill the tidal marshes along the neck that connected the peninsula to Roxbury, the Mill Pong on the north side of the city, and all along the waterfront.

The newly filled land was platted in planned grids. Large speculative grids were also laid out in South Boston and Roxbury. Residential and industrial uses were often mixed in a confused patchwork. An institutional fringe of hospitals, prisons, almshouses and naval facilities developed on the fringes of waterfront and filled land, between the central core city and the outlying residential areas.

Early Industrial Period (1830-1870)

The *Historic and Archeological Resources of the Boston Area* notes that the social / political events of this period are the Civil War, several economic depressions, and the large scale European immigration due to the Irish potato famine and the German revolution (both 1848).

The Stony Brook and Muddy rivers in the relatively rural Roxbury neighborhoods as well as a thriving sea port and large population of immigrants fed the industrial revolution in Boston making it one of the biggest producers of goods throughout the world.

The settlement in this period is defined by innovations in transportation including steam ferry, suburban commuter rail service and horse drawn street railways which augmented and later replaced the omnibus stage routes.

Important events in landscape and urban planning include an emerging green belt of landscaped cemeteries and municipal properties such as reservoirs. These were accessible by street railway and provided important areas for recreational and social activity for people in the inner city and outer suburban areas.

Residential development in the central core of the city included high density rowhouses built in planned street grids around London-style residential parks. This pattern can be seen in the

South End. A similar pattern was constructed in Charlestown around Monument Square and other small parks, and also in East Boston.

Boston's central core increased in density with greater height and proximity of buildings, and differentiation of a central business and commercial district, and high-density residential areas.

Late Industrial Period (1870-1915)

Development in this period was influenced by electrical power, telephone, and the use of concrete as a building material. Transportation improvements included the electrification of the street railway system and the opening of the subway and elevated lines. The construction of the Charles River Dam, the Great Fire of 1872 and the annexation of adjacent towns also impacted the city.

Larger buildings were created in the urban core of Boston, increasing the density. The residential neighborhoods became differentiated by high and low income. An influx of immigrants lived in the North and West Ends, while Beacon Hill and Back Bay continued as affluent districts.

During this era, secondary commercial areas developed at Kenmore Square on the end of downtown, and in Fields Corner, Uphams Corner, Dudley Station and Jamaica Plan along major transit routes. These nodes served the immediate residential population of an expanding city.

The metropolitan park system (1879-1894) was created and provided open spaces for recreation amidst dense suburban development. Parkways were created that were new transportation corridors that stimulated residential and commercial development in the areas beyond the park boundaries.

Early Modern Period (1915-1940)

This era was defined by two World Wars and the Great Depression. The population in the core of Boston decreased for the first time in history.

Railroad and waterfront activities began to become obsolete as highways and new fuel storage facilities replaced coal yards and

older wharves and warehouses. Military docks, shipyards and facilities expanded and overwhelmed the communities of Charlestown and South Boston. Industrial activity began to decline in the core of Boston.

The widespread use of automobiles and commercial air service had an influence on the development of Boston. Boston Municipal Airport, now Logan Airport (1923), Sumner Tunnel (1934), and construction of the regional highway system (1931-1936) further influenced development.

Universities, hospitals and industry developed in the fringe edges of the city, as highways and auto routes expanded. New commercial areas developed to serve expanding suburban residential areas. issues all led to abandonment and decay in the inner core of Boston.

The use of automobiles meant that people were no longer restricted to recreational facilities served by trolley or train lines. Greater mobility allowed people to enjoy ponds, woods and other scenic or historic areas that were on the periphery of the city. A series of parkways was developed as part of the park system developed by the Metropolitan District Commission in the Late Industrial Period. These parkways were scenic routes and also connected the suburban residential areas to the urban core. These included the Jamaica Way, Commonwealth Avenue, and Morrissey Boulevard.

Geographic Expansion

The Boston Redevelopment Authority notes that the city has grown to 40 times its original size from its original 783 acres at the time of settlement in 1630. Boston was originally about 1.2 square miles, which is smaller than Central Park in New York City. Boston currently has a land area of 48.4 square miles. It is the second smallest major US city in terms of land area, but that land mass was hard earned through the filling of wetlands and annexation of neighboring municipalities.

The growth issues that impacted land making in Boston included wharfing along the waterfront, pollution from waste disposal, the prospering sea trade, railroads, Irish immigration, public parks, harbor improvements, port development, and transportation innovations.

Community Setting

Original Land Mass

The Reverend William Blackstone was the first settler on the peninsula. He was the first to record the use of the word "Shawmutt" to describe the place in 1630, in an invitation to John Winthrop to move the site of Winthrop's colonial settlement from Charlestown to the peninsula. Charlestown lacked a source of fresh water, while the Shawmut peninsula had a spring on the north side of what is now Beacon Hill.

When the colonists arrived, the peninsula was about 800 acres of land that was surrounded by the deep channeled Boston Harbor, and the tidal land of the Back Bay, which was an estuary of the Charles River.

To the south, a narrow isthmus (later known as Boston Neck) which was 120 wide at high tide, supported the single road (now Washington Street) that connected the peninsula to Roxbury on the mainland.

The peninsula originally had five hills – Copp's Hill (in the North End); Fort Hill (in the Financial District); and the Trimount (meaning triple mountain) which actually consisted of the three hills of Mt. Vernon, Beacon Hill and Pemberton Hill. Trimount is the source of the name of Tremont Street.

A Topographical Historical Description of Boston notes that landmarks of the original peninsula included numerous points, or headlands - the most distinguishable of which were Blaxton's Point (named for William Blackstone), Barton's Point, Hudson's Point, Merry's Point, Fort Point, and Windmill Point. Between the points were coves. The building of wharves and filling of coves would obliterate these early landmarks.

Land Making

The first land making in Boston began with the "wharfing out" from the mainland. *Gaining Ground* notes that the passage of laws in 1641, allowed waterfront property owners to build to the low tide line. The area between the wharves was then often filled in, creating more land.

Community Setting

Except for the wharves, there was little change in the topography and landform of Boston until 1775. Then the landscape was radically transformed over 100 years to serve growth. Expanding on to the mainland was not considered at first because of the city's maritime economy. The solution was to fill the tidal flats in the same method used to make wharves – by creating a structure and then filling in the landward side until the level rose above the high tide.

A second motivation for filling the tidal flats was to deal with sewage. For several hundred years animal, human, commercial and industrial waste in a dense and busy city was disposed of by piping it to the tidal flats. Mill dams were built in multiple places, which enabled industry. However, these dams prevented the tides from flushing the flats, allowing sewage and trash to build up and create a noxious condition.

At first , much of the land was created by filling in the tidal areas with earth from Boston's original hills. Later, gravel was brought by train from Needham to fill the Back Bay. After The Great Boston Fire of 1872, workers used building rubble as landfill along the downtown waterfront.

By 1775, the city had built Long Wharf to the east, which was about one half mile in length and extended beyond the tidal flats.

In 1803, Mount Vernon was used to fill an area along the river adjacent to Charles Street, west of Boston Common. This created a new area for the rope making industry that had been devastated by a fire in 1796.

From 1807 to 1828, the Mill Pond at North Cove was filled, which eventually added about fifty acres of land to the city. Beacon Hill and Copp's Hill were cut down with shovels, pick axes and horse-drawn wagons, in a slow process that took 21 years to complete. The three acre Burying Ground on Copp's Hill was not removed, and the City built a retaining wall around the graveyard to prevent it from eroding. Today the State House sits on the shortened Beacon Hill.

In exchange for filling the Mill Pond with gravel, the corporation that owned it was allowed to sell the land plots and keep all of the proceeds. Architect Charles Bulfinch designed the pattern of

streets for the new land of the Mill Pond, with the outermost edge of that plan now Causeway Street. This area later became the Bulfinch Triangle.

In the 1830s, owners of the wharves along the South Cove (including Griffin's wharf where the Boston Tea Party took place) decided that it would be more profitable to fill the cove and wharves to build railroads than to keep the cove open for shipping. Fort Hill, now the Fort Point neighborhood, was cut down and used it to fill the South Cove. This created what is now known as Chinatown. What was the Great Cove, became the Financial District in 1833. The project reached completion in 1845. The filling of these coves added almost 300 more acres to the city.

In 1835, Pemberton Hill was used by the Boston & Lowell railroad company to fill in tidal flats to build tracks just north of Causeway Street, where North Station now sits.

From 1818 to 1821, a causeway with a toll road was constructed across the Back Bay. The Boston & Roxbury Mill Dam was a stone dam that was a mile and a half long and fifty foot wide, from the foot of Beacon Hill to Sewell's Point (Kenmore Square) in Brookline. It enclosed 600 acres of the Back Bay. The dam proved a failure as industry failed to locate there. It also created significant environmental issues as raw sewage accumulated in the stagnant waters. Finally, the demand for land in Boston was growing and the interest in making new land grew.

From 1857 to 1894, the Back Bay was filled in behind the Boston & Roxbury Mill Dam. This added about 700 acres and nearly doubled the size of the original peninsula. The city's hills had already been cut down, so the invention of the railroad and steam shovel made it possible to bring in gravel from Needham for fill. At the peak, 3,500 carloads of gravel from Needham were dumped into the Back Bay per day (and night). After the Great Fire of 1872, rubble was used as fill. The area became the Back Bay neighborhood.

In 1865, the West Cove was filled in, adding 203 new acres.

Charlestown and the Fenway area were filled in shortly later. The end of the 1800s included fill projects in East Boston, Marine Park and Columbus Park to the south.

Community Setting

The area which would become Logan airport began to be filled in 1922.

Annexation

The city has also grown significantly through annexation of adjacent towns over the years. Boston annexed South Boston in 1804, East Boston in 1836, Roxbury in 1868, Dorchester including Mattapan and a portion of South Boston in 1870, Roslindale in 1873, Brighton including Allston in 1874, West Roxbury including present day Jamaica Plain and Roslindale in 1874, Charlestown 1874, and Hyde Park 1912.

Urban Renewal

Boston was in decline in the mid-1900s, as factories became old and obsolete, and businesses moved out of the region for cheaper labor elsewhere. The city was in need of infrastructure improvements, as well as economic infusion. The Boston Redevelopment Authority (BRA) was established in 1957 and responded to this disinvestment by undertaking urban renewal projects. One project significant for its open space was the creation of Government Center which included City Hall Plaza, which was intended to be monumental in relation to City Hall, but is often criticized for its massive scale and lack of relationship to its context.

Central Artery/Tunnel Project

The landscape of downtown and South Boston was particularly impacted by the Central Artery/Tunnel Project (the "Big Dig"), which removed the elevated Central Artery and created a new highway tunnel through downtown. It was the largest, most complex and costliest highway and tunnel project in the nation's history. This project created a total of 300 acres of new and restored open space, including 45 open parks and major plazas. The Rose Kennedy Greenway was one a major additions to the landscape of Boston.

Creating Land for Parks

Gaining Ground notes that the public park movement and the establishment of the Boston park system required a great deal of land making. The park movement in the US began in the mid-

Community Setting

1800s in response to urbanization and the sanitary reform movement (which believed that disease was caused by bad odors, dirt and dampness). Sanitarians sought to eliminate places that were overcrowded, dark and damp and contained organic waste by introducing sunlight, fresh air, dry land and pure water – and parks were seen as a solution. Parks were for the public and were a place where city residents could escape to a country setting.

The improvements made to the Public Garden in the mid-1800s were intended to provide an amenity such as Central Park in New York City which was constructed in 1857. Boston residents wanted more parks, and eventually the voters approved an act in 1874 that set up a Parks Commission to establish and run public parks. In 1876, the Commissioners recommended a comprehensive system of seven parks in the inner city and four in outlying areas which would be connected by parkways. By 1881, the City appropriated the funds for the parks.

Gaining Ground notes that the Park Commissioners had tried to locate a park in each section of the city. Some parts of the city did not have enough remaining open land, so in those sections the parks were placed on the shore where land that had to be filled in. Parks in this original system that required filling included Charlesbank in the West End, Marine Park in South Boston, and Wood Island Park in East Boston.

Gaining Ground notes that in the 1890s, Boston created more parks, mostly in parts of the city without an original park. Most of these were playgrounds, as the playground movement was similar to the park movement and sought to improve the lives of the urban poor children through organized activities meant to improve their morals, rather than the park movement which meant to improve their health. Some of these parks were also on the shore and required filling, such as Charlestown Playground (now Ryan) and Charlestown Heights (now Doherty Playground).

Gaining Ground notes that the 1876 plan for the Boston park system also included a series of parkways to connect these parks. These parkways would create the Emerald Necklace,, including two parkways that are no longer considered part of the Necklace – Columbia road (originally the Dorchesterway) in Dorchester and Day Boulevard (originally the Strandway) in South Boston. Some of these parkways also required extensive filling, including the

Riverway, Day Boulevard, and Neptune Road that once connected Wood Island Park to the East Boston.

Gaining Ground notes that land continued to be made to the twentieth century to create public parks. The narrow Esplanade was filled along the Charles River as part of the Charles River Dam. The Esplanade was widened twice in the 1930s and 1950s. Playgrounds and beaches were created by filling such as Savin Hill (now McConnell Park) and Tenean Beach in Dorchester, Columbus Park (now Moakley) and Carson Beach in South Boston, and Orient Heights Playground (now Noyes) and Constitution Beach in East Boston.

Storrow Drive was created in 1950 on part of the Esplanade that had been constructed with the Charles River Dam. To compensate for land that was taken, some filling was done along the river, creating a series of connected islands and lagoons.

Spectacle Island

The most recent major change in the Harbor Islands is the reconstruction and expansion of Spectacle Island, which opened to the public in 2006. This island was originally two natural glacial drumlins. The 114-acre site was in part created by a landfill that was then capped with dirt from the Big Dig. Spectacle Island is owned by the Massachusetts Department of Conservation and Recreation and the City of Boston. The Island Alliance and the National Park Service assist the owners with island management. Spectacle Island features a marina, visitor center, café, two sandy beaches and five miles of walking trails that lead to the crest of a 157 foot-high hill.

Muddy River

The Muddy River was originally designed in the late 1800s by Frederick Law Olmsted and engineer Alexis French to create a park that would also serve as a flood control channel. A century later a master plan for the restoration of the park did not emphasize this function. The cumulative effect of 100 years of changes meant the once effective storm water control system could no longer do its job. The capacity of the Muddy River was reduced by increased impervious surfaces, narrowing of the river and culvertization, invasive vegetation, and sedimentation. The City of Boston, City of

Community Setting

Brookline, Commonwealth of Massachusetts and the US Army Corp of Engineers developed a comprehensive program to restore the Muddy River. This $92 million effort is guided by The Emerald Necklace Environmental Improvements Master Plan.

Effects of Location

The 2006 *Massachusetts Statewide Comprehensive Outdoor Recreation Plan* describes the impact of location and landform of the development of the Boston Metro Region:

"This region comprises the Boston Basin, formed by the ring of highlands surrounding Boston Harbor and the urban core of the city. To the south are the prominent and historic Blue Hills, a rugged and ledge filled upland chain of ancient geologic age. To the west lie the Arlington Heights, and to the north, the Middlesex Fells Reservation incorporates another rim of the basin. While the Boston Basin extends outward of these highlands, to the north and west, based on bedrock geology and ecoregion definition, these features nonetheless help to define the region, so much so that Charles Elliot recognized them in his visionary plan. This plan, perhaps the first ecoregion plan, has become the cornerstone of the DCR urban park system; its simple but insightful formula is to connect the hills, through the river corridors, to the sea.

The other correspondingly significant landscape features of this system are the several major rivers: the Charles, Neponset and Mystic. The force of these rivers, over geologic time, along with glaciation and weathering processes, have acted to produce the landscape that New England's "hub" now occupies. Because of the low gradient of the rivers, and the scraping action of the glaciers, the region is rich in wetlands, both salt and fresh, yet nearly devoid of lakes and ponds.

In contrast, the coastline itself is a profoundly important physical feature of this region, including such unique areas as the islands of Boston Harbor, the great peninsulas of Hull, Hough's Neck, Squantum, Winthrop's Deer Island, and Nahant. This deeply embayed and varied coastline encloses Massachusetts Bay, and through its outstanding scenic and recreation resources, along with its economic ones, acts as a powerful magnet to human population. This region is home to almost one-third (31%) of the state's total population. With this density of population, forest and agricultural

resources are obviously more limited in area than in other parts of the state."

Boston has evolved through the centuries from an area of Native American encampment, to a coastal colonial outpost, to a major metropolis of global significance. The harbors, shoreline, tidal flats, lakes, ponds, marshes, and riverbanks have provided food and water, enabled transportation, encouraged trade, and influenced development throughout the history of this place.

Some 7,000 years ago, native peoples came to the area to fish and hunt. They camped on the islands and on the mainland, including what are now Boston Common and Arnold Arboretum.

The first European settlers arrived and founded Boston in 1629. The landscape of steep hills and small valleys with ponds, streams, and rivers was amenable to early agriculture. This was a world of cod and merchant ships, a place of rivers and meadows that carried settlement inland.

This setting made possible a seaborne commerce that flourished with protected deep-water harbors. Early manufacturing utilized the waterpower of streams and rivers. The rolling terrain offered a venue first for farmland, then suburban estates, and then streetcar suburbs as the population increased throughout the 19th century.

Many of the original land and water physical features have been greatly altered through the centuries - hills were leveled and used to fill wetlands; streams were covered over for housing and industry; the shoreline was pushed eastward; military installations were built and buried on harbor islands and along coastal promontories; and an airport was built over islands and wetlands.

History of Parks in Boston

Metropolitan Park System

In *Remaking Boston*, James O'Connell notes that Boston was the first American city to create a metropolitan park system and the first to undertake regional planning. The Metropolitan Park System was established in 1893. Frederick Law Olmsted's concept of networked parks was applied to the metropolitan region. These parks were the first regional effort to protect environmentally

significant areas and mitigate the rampant real estate development of the late 1800s. The metropolitan parks and parkways provided a physical framework for suburban growth. This system provided extensive preserved open spaces, recreational facilities and scenic motorways. A goal was to preserve wilderness areas and clean up beachfronts and riverbanks, as well as provide exposure to nature and fresh air, playgrounds and recreational facilities.

The leading advocates of this effort were Charles Eliot who was a landscape architect, and Sylvester Baxter who was a social reformer. These two men believed that a metropolitan government was needed to carry out major public works projects and provide the planning that would create a rational spatial and infrastructure framework for development.

In 1891, Eliot and Baxter helped to establish a private nonprofit called the Trustees of Reservations, the world's first such conservation organization, in order to preserve scenic open spaces. Eliot and Baxter then advocated for the creation of the Metropolitan Park Commission to develop a plan for a regional parks system. This Commission was given eminent domain powers.

The commission issued the *1893 Report of the Metropolitan Park Commissioners*, which was the country's first regional plan, and was a blueprint for preserving Greater Boston's natural areas. The plan focused on the forest on the edge of the city, in the Middlesex Fells, Blue Hills and Stony Brook. It focused on riverbanks along the Charles, the Mystic and the Neponset Rivers and developed reservations, while the Metropolitan Sewage Board diverted untreated effluent. A third focus was Oceanfront Beaches and many were preserved in outlying towns such as Revere. Eliot further proposed that the Harbor Islands be preserved as parkland. Finally, the plan proposed parkways between the city and the reservations.

The plan for the Metropolitan Parks system was implemented within a decade. By 1900, the Metropolitan Park Commission had acquired 9,177 acres of reservations, 13 miles of oceanfront, 56 miles of riverbanks, and built seven parkways.

The State created the Metropolitan District Commission in 1919. In the 1920s, the MDC converted the sylvan parkways to four lane motorways. By the 1930s, parks were evolving from beautification

and preservation of nature, to providing opportunity for recreation. The MDC added recreational facilities to its park system, including ball fields, golf courses, tennis courts, swimming facilities and a ski run at Blue Hills.

After World War II, auto use increased and highways were constructed through natural areas. Suburban flight led to less interest in urban parks. After years of neglect, the MDC system originally created by Elliot was rediscovered and revived.

Frederick Law Olmsted proposed to create a network of preserves linked by parkways. In 1875, the Boston Park Commission initiated the creation of the Emerald necklace which included the Charles River embankment, the Fenway, Jamaica Pond, Arnold Arboretum, Franklin Park, and City Point in South Boston. The parkways to connect these parks included the Arborway, Fenway, Jamaicaway and Riverway. His goal was to establish the foundation for a larger metropolitan system.

City of Boston Parks

The Office of the Superintendent of [the Common and] Public Grounds was established by ordinance on February 28, 1870. The Superintendent had charge of all the public grounds and was also the only person authorized to trim the trees in the streets and of all the public grounds, except the parks established under Stat. 1875, Chap. 185.

The Bath Department was established by ordinance in 1898. The Trustees had care and custody of all the bath-houses and indoor gymnasia. The Music Department was established by ordinance on April 23, 1898. The board was given charge and control of the selection of public music, to be given either indoors or in the open air, for parades, concerts, public celebrations and other purposes under the authority of the City Council, except entertainments for children on the Fourth of July.

On May 6, 1875, the Massachusetts Legislature approved Chapter 185 which was "an act for the laying out of parks in the city of Boston." This act was then accepted by a vote of the people of Boston on June 9, 1875. This act established the Board of Park Commissioners. It enabled the Commission to locate and create parks; make rules and regulations for the governance and use of

parks parkways, playgrounds, streets, structures and other premises under its charge; and to fix penalties for breaches of such rules and regulations.

The first Board of Park Commissioners consisted of three members who served without compensation. It was appointed on July 8, 1875 and confirmed on July 15, 1875. The department continued up to 1913, when it was merged with the Public Grounds, Bath and Music Departments, under the name of Park and Recreation Department by the provisions of Chapter 10, Ordinances of 1912, which went into effect in March of 1913.

The chairman of the Board of Park Commissioners became a salaried official and was required to devote his entire time to the work, likewise the Deputy Commissioner. In 1920, the Cemetery Department was merged with the Park Department. On May 1, 1954, the department became the Parks and Recreation Department. The Associate Commissioners serve without compensation.

Boston Parks and Recreation Commission

The Commission oversees the Parks and Recreation Department, and has broad powers and a wide range of duties and responsibilities. The basic authority of the Commission is set forth in three places - in the Massachusetts General Laws, particularly Chapter 45 to the extent that certain provisions therein are applicable to Boston; in special acts of the legislature applicable only to Boston; and in Municipal Code Section 7.4. The most significant and common duties are summarized below.

The Commission may lay out and improve public parks, make rules for their use and government, appoint all necessary engineers, surveyors, clerks and other officers, including a police force to act in such parks, define their powers and duties and fix their compensation and do all acts needful for the proper execution of their powers and duties (*M.G.L. Chapter 45 Section 5 on Boards of Park Commissioners* and *Municipal Code Section 7-4.8 Promulgation of Rules and Regulations, Fixing of Penalties).*

The Commission shall construct, improve, equip, supervise, and regulate the use of all parks, public grounds, playgrounds, baths, beaches, gymnasia, ways or other means for public recreation and

urinals and public convenience stations upon park lands and public grounds, placed in charge of the Parks and Recreation Department, the Board of Metropolitan Park Commissioners, or the legislature, or in any other manner (*Municipal Code Section 7-4.3 Control of Parks, Public Grounds, Baths, Beaches, Gymnasia and Convenience Stations)*.

The Commission shall provide written approval of construction or alteration of all buildings and structures within 100' of a public park or parkway (*Municipal Code Section 7.4-11 Permission for Construction Near Parks or Parkways)*.

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Section 3.3:
POPULATION CHARACTERISTICS

Socioeconomic status is a measure of an individual's or family's economic and social position relative to others based on income, education, and occupation. Low socioeconomic status is associated with limited access to regular health care, adequate housing, quality education, nutritious food, recreational opportunities, and other resources associated with a healthy lifestyle. The socioeconomic status of Boston residents varies by race/ethnicity, gender, and age.

Population

In 2010, Boston had a population of 617,594. The population has been rising over time.

	1990	2000	2010
Total Population	574,283	589,141	617,594

The city is the largest in the state and in New England. It is the anchor of a larger area called Greater Boston, the tenth-largest metropolitan statistical area in the country with 4.5 million people. The commuting region is home to 7.6 million people, making it the fifth-largest combined statistical area in the United States.

A somewhat dated but informative BRA document titled *Boston's Population Doubles – Every Day* (1996) noted that there may be 1.2 million persons within the city boundaries during work hours, and as many as 2 million persons during special events. Hundreds of thousands of people travel in to Boston daily for work, education, health care, culture, recreation, special events, etc.

Density

The Draft 2012 SCORP notes that Massachusetts had 6,547,629 residents in 2010. It is the third most densely populated state in the country with 839.4 people per square mile. Only Rhode Island and New Jersey are more densely populated states.

Community Setting

In 2010, Boston had a population of 617,594. It has a land area of 48.4 square miles. The population density is 12,760 persons per square mile or 19.94 persons per acre. This is an increase from a population density in 2000 of 12,172 persons per square mile.

This density increase indicates that the need for more open space should be evaluated, as more people will put greater pressure on existing spaces.

Age

The Metropolitan Area Planning Council (MAPC) has assisted other communities in the Boston metro region with the production of open space plans, which have included the following summary of the recreational needs by age group:

Under the age of five, most recreation is done with parental supervision. This recreation tends to be close to home due to the difficulties of traveling with children. This age group also needs structured preschool programs that focus on teaching basic skills. For older children, adults seek places to take their children for walks. Adults with older children also seek out programs for their children that provide family recreational opportunities.

Adolescents are a difficult age group to serve because they do not like to participate in traditional programs that are structure d or involve adult supervision. They prefer programs where they are more actively involved in determining the activities. Programs that work well for adolescents include rock climbing, adventure programs, skateboarding, hiking, band concerts, cook outs, dances and sports.

The needs of elderly residents are divided between the younger, more active senior citizens and the frail elderly. The frail elderly generally require therapeutic recreational services. More active seniors tend to enjoy walking, golf, tennis and swimming.

The needs of residents with disabilities also vary. Some residents with disabilities can participate in regular recreational programs without any modifications while others may need some assistance. Depending on the degree of disability, there may also be a need for specific programs geared for that population. Physical barriers are a key factor and will need to be evaluated through the American

Community Setting

Disabilities Act Section 504 process and eliminated in a systematic fashion. Programmatic changes may also be necessary, including training staff on how to work with disabled residents.

	2010
Total Population	617,594
Population under 19	135,592
Population 20-34	216,213
Population 35-54	147,501
Population over 65	118,288

Children under 18

The BRA report that in 2010 there were 103,710 children between the ages of 0 and 17 living in Boston. This represents 16.8% of the total city population.

	2010	% under 18	% of total population	% change since 2000
Total Under 18	103,710			
Under 6	38,089	36.7%	6.2%	-1.0%
6 to 11 years	31,701	30.6%	5.1%	-22.4%
12 to 17 years	33,920	32.7%	5.5%	-8.8%

Nearly 40% of Boston's children live in Dorchester or Roxbury. Dorchester has a significantly greater population of the children under 18 years compared to its proportion of the citywide overall population. Neighborhoods in which children make up more than 20% of the population include Dorchester, Roxbury, Mattapan, Hyde Park, Roslindale, East Boston, and West Roxbury.

The population of children in Boston dropped 11% since 2000. This drop was seen in all racial and ethnic groups except Hispanic. African American and Hispanic children comprise 60% of the under 18 population in Boston.

Community Setting

Young Adults 20-34

The BRA notes that Boston has the highest concentration of young adults (age 20-34) among the 25 largest cities in the US. 35% of Boston's population is between 20-34 years old. The population of 20-34 year olds in Boston has increased 11% since 2000. The City's population grew about 5% during that same time period.

The growth of the 20-34 population represents 75% of the city's total population growth over the last decade. Much of this increase was driven by the 20-24 year olds whose population grew by close to 26% between 2000 and 2010.

Neighborhoods with a large population of young adults age 20-34 as a percentage of the neighborhood population include Allston (64.5%), Fenway (59.2%), Brighton (55.7%), North End (54.8%), Longwood (51.7%), Beacon Hill (50.9%), South Boston Waterfront (50.5%), Mission Hill (48%), Back Bay (46.5%), and South Boston (41.4%).

Of the young adult population age 20-34, 60% rent their homes, 29.5% own their homes, and 9.4% live in group quarters such as college dorms.

Elderly

The elderly population remained fairly constant between 2000 and 2010. Just over half of the elderly population is between the ages of 65 and 75 years. 94.7% of the elderly live in some form of household, while 5.3% live in group quarters.

In 2010, Bay Village had the highest percentage of elderly residents (21.3%). Other neighborhoods with a higher percentage of elderly include West Roxbury (18%), the West End (16.6%), and Chinatown (15.3%). In 2010, Dorchester had the largest number of elderly residents with close to 11,000. The next highest was West Roxbury with 5,476.

Approximately 41.6% of the elderly live with some type of disability.

Community Setting

Projections

The *MetroFuture Regional Plan* provides projections for the region. It notes that in 2030, one third of residents will be 55 or older. All other age groups will shrink, including school-age children which may decline by 6%.

MAPC's *Population and Housing Demand Projections for Metro Boston* (January 2014) provides two scenarios for growth – Status Quo and Stronger Region. The population projections for Boston under the two scenarios are below:

Status Quo Scenario

Status Quo	1990	2000	2010	2020	2030
Total Population	574,283	589,141	617,594	640,798	664,867
Population under 15	94,381	98,320	85,766	90,657	92,706
Population over 65	65,152	61,336	62,237	78,018	96,079

Stronger Region Scenario

Stronger Region	1990	**2000**	**2010**	**2020**	**2030**
Total Population	574,283	589,141	617,594	664,218	709,400
Population under 15	94,381	98,320	85,766	93,217	99,568
Population over 65	65,152	61,336	62,237	78,688	97,393

Race, Ethnicity, and Country of Origin

The BRA reports that in 2010, Boston was 47% White, 22.4% Black, 17.5% Hispanic and 8.9% Asian. Of this, 43.8% of Hispanics and 69.5% of Asians are foreign born.

	2000	2010	Change	% Change
Total	589,141	617,594	28,453	4.8
White	291,561	290,312	(1,249)	-0.4
Black	140,305	138,073	(2,232)	-1.6
Hispanic or	85,089	107,917	22,828	26.8

Latino				
Asian	44,009	54,846	10,837	24.6

The BRA reports that between 1990 and 2010, Boston's foreign born population grew from 114,597 to 167,311. Immigrants now account for 26.7% of the city's population. Boston has the 6th highest proportion of foreign born residents among the 25 largest US cities.

1n 2010, the most common countries of origin for Boston's foreign-born residents are as follows: Dominican Republic (18,189 persons), China (16,785), Haiti (13,782), Vietnam (7,684), El Salvador (7,575), Columbia (6,703), Cape Verde (6,457), Jamaica (5,637), Brazil (4,823), and India (4,203).

In 2010, 35% of Boston's residents spoke a language other than English at home. 9.5% of Boston residents had limited English proficiency. Spanish is the most common foreign language spoken in Boston, with 15.2% of the population speaking it. French (4.8%), Chinese (3.8%), Portuguese (2.0%) and Vietnamese (1.7%) are the next most common foreign languages spoken in Boston.

The neighborhoods of Boston where 25% of the population was foreign born includes East Boston (50.3%), Mattapan (35.5%), Allston (33.1%), Downtown (32.4%), West End 932.3%), Dorchester (31.1%), Hyde Park (29.9%), Brighton (29.5%), Roslindale (29.1%), Mission Hill (24.7%) , and Roxbury (24.6%).

There are higher concentrations of children within the Black and Hispanic communities. 76% of Boston Public School students are Black and Hispanic.

The *MetroFuture Regional Plan* provides projections for the region. It notes that in 2030, that 31% of the region will be Black, Hispanic, Asian or another non-White race. If current trends continue, the growth in non-White populations will be confined to a dozen urban cities and the region's suburbs will change very little.

By 2030, almost one-quarter of the region will be foreign born.

Community Setting

Income

When incomes are lower, persons and households may be more dependent on public open spaces close to home for their outdoor leisure pursuits.

The BRA reports in *Boston in Context* that the median family income in Boston was $61,109. The neighborhoods with median family income below $61,109 include Roxbury, Mission Hill, East Boston, Dorchester, Mattapan, Longwood, and Brighton.

The median household income was $52,065. The neighborhoods with median household income below $52,065 include Roxbury, Longwood, Fenway, Mission Hill, Allston, Dorchester, Mattapan, East Boston, and Brighton.

The per capita income in Boston was $33,158. The neighborhoods with per capita incomes below $33,158 include Longwood, Roxbury, Mission Hill, Fenway, Mattapan, Dorchester, East Boston, Hyde Park, Roslindale, and Brighton.

The BRA notes that Household Income in Boston was as follows:

Household Income	
$0-9,999	13.1%
$10,000-24,999	16.2%
$25,000-49,000	19.3%
$50,000-74,999	15.3%
$75,000-99,000	11.3%
$100,000-149,999	12.6%
$150,000+	12.2%

The BRA reports that in 2012, the poverty rate in Boston was 21.4%. This was due in part to the high concentration of affordable housing units and public housing in the city.

The poverty rate in Boston is also impacted by the number of college students. Boston's population of young people age 18-24 have a poverty rate of 41% but 81.4% of this group is currently enrolled in college.

Community Setting

The neighborhoods with poverty rates over 20% of the population include Fenway, Roxbury, South End, Dorchester, Jamaica Plain and Mattapan.

The BRA reports that in 2012, the unemployment rate in Boston was 10.2%. The neighborhoods with unemployment rates over 10% of the population include Roxbury, Mattapan, South Dorchester, Hyde Park, South End, Fenway, and East Boston.

Nearly 30% of Boston's children live in poverty. The following neighborhoods have very high poverty rates among children: Roxbury (49.7%), South Boston (43.8%), Charlestown (42,4%) and Mission Hill (39.4%).

Over 21% of Boston's elderly live in poverty.

Cost of Living

The Boston Indicators Project notes that Boston is second only to Washington DC in terms of the highest median household income among comparable cities, the costs for housing, energy, health care and college tuition combine to make Boston one of the highest-cost cities in the nation. Boston "works" best for higher income households and for those with subsidized housing and public benefits, but is particularly challenging for low and middle-income households without subsidies that have taken on record mortgage and education debt.

Boston has one of the highest costs of living in the United States, and was ranked the 129th most expensive major city in the world in a 2011 survey of 214 cities. Despite cost of living issues, Boston ranks high on livability ratings, ranking 36th worldwide in quality of living in 2011 in a survey of 221 major cities.

Households

Open spaces provide an important venue for social interactions between and within families and households. The increasing number of households and the resulting pressure for housing puts pressure on existing open spaces and the remaining land resources available for future open spaces.

Community Setting

The BRA notes that there were 252,699 households in Boston in 2010. Of these, 136,455 (54.0%) were non-family households and 116,244 (46%) were family households.

Of the family households, 64,502 (55.5%) were husband-wife families of which 25,307 (40%) had children under 18. 41,301 (35.5%) were female household families of which 22,741 (55%) had children under 18. 10,441 (9.0%) were male household families of which 3,513 (34%) had children under 18.

The average household size was 2.26 and the average family size was 3.08.

Hispanic and Black populations are more likely to live in family households, while 43.2% of Boston's White population lives alone.

Housing

MAPC's *Population and Housing Demand Projections for Metro Boston* (January 2014) provides two scenarios for growth – Status Quo and Stronger Region. The demand for housing units for Boston under the two scenarios are below:

Status Quo

Status Quo	2000	2010	2020	2030
Households	239,528	252,699	271,109	285,176
Housing Units	251,935	272,481	292,823	307,504

Stronger Region

Stronger Region	2000	2010	2020	2030
Households	239,528	252,699	279,515	301,774
Housing Units	251,935	272,481	301,696	324,975

Community Setting

Multi-family housing is the general rule in Boston. Renters and owners in multi-family structures will tend to have less access to open space on-site, and therefore have greater need for open space availability in the public realm.

Automobiles

The availability of a motor vehicle for a household leads to mobility and access to recreation areas much farther from home than walking distance. In 2010, 36% of households in Boston did not have a car. This makes these residents generally dependent on walking or various forms of mass transportation to access open space. The BRA document *Boston in Context* notes that the neighborhoods where 50% or more of the residents did not have cars include Back Bay, Beacon Hill, Downtown, Fenway, Longwood, Mission Hill and the North End.

Means of Commuting

There are 310,881 workers age 16+ in Boston who are residents of the city. Of those, 143,309 (46.1%) commute by vehicle; 46,173 (14.9%) walk to work; 39,186 (12.6%) commute by bus or trolley bus; 54,330 (17.5%) commute by subway; 4,008 (1.3) commute by railroad; and 4,703 (1.5%) commute by bicycle.

Income Generators

Occupations

The BRA notes *Boston in Context* that there are 319,146 residents over 16 in Boston with occupations. Of this, 146,175 (45.8%) work in Management, Business, Science and Arts occupations. 67,913 (21.3%) work in Service occupations. 71,285 (22.3%) work in Sales and Office occupations. 13,420 (4.2%) work in Natural Resources, Construction, and Maintenance occupations. And 20,353 (6.4%) work in Production, Transportation and Material Moving occupations.

Community Setting

Industries

The BRA notes *Boston in Context* that there are 319,146 residents over 16 in Boston with occupations in the following industries:

- 430 (.1%) work in Agriculture, Forestry, Fishing and Mining.
- 10,240 (3.2%) work in construction.
- 14.432 (4.5%) work in Manufacturing.
- 5,103 (1.6%) work in Wholesale Trade.
- 27,170 (8.5%) work in Retail Trade.
- 9,983 (3.1%) work in Transportation and Warehousing.
- 8.902 (2.8%) work in Information.
- 31,035 (9.7%) work in Finance, Insurance and Real Estate.
- 48,334 (15.1% work in Professional, Scientific, and Waste Management services.
- 98,317 (30.8%) work in Educational services, Health Care and Social Assistance.
- 35,845 (11.2%) work in Arts, Entertainment, Recreation, Accommodation and Food Services.
- 14,484 (4.5% work in Public Administration.

Employers

The *Largest Employers in the City of Boston* report (BRA, 2013) provides an overview of the largest private sector employers, defined as having 500 employees or more. The analysis revealed that there are 121 private sector companies in Boston with more than 500 employees. These companies account for 196,446 jobs. Massachusetts General Hospital, Brigham and Women's Hospital and Boston University together provide more than 35,000 jobs.

Boston's largest employers are mainly providers of Health Care and Social Assistance, Finance and Insurance, and Educational Services. These three industries account for 144,070 jobs across 61 companies, representing 73% of all employment among Boston's largest employers.

However, not all business is big business in Boston. The BRA produced a report on *Boston's Neighborhood Business Patterns* (2014) that states that the majority of firms in Boston are small employers with almost half of the establishments having 1-4 workers. There are 8800 immigrant owned small business in Boston that generate almost $3.7 billion in annual sales and employ 18,500 people.

Community Setting

The *Boston by the Numbers* fact sheet (BRA, 2011) notes that the city is the location of 35 public and private colleges and universities. Boston's colleges and universities employ over 42,600 people which is 6.5% of the jobs in the city.

Agriculture

The Boston Indicators Project notes that an emerging industry is local food production and provision. This trend is seen in food trucks, farmers markets, farm-to-school programs, and plans for urban hydroponic farms, and a regional food system. Food-Preparation and Serving accounts for 45,540 Boston jobs in 2010 and is one of Boston's fastest growing occupations.

The City enacted Article 89 Urban Agriculture in 2014. This zoning allows for ground level and roof top farms in the city. The city also allows community gardens, many of which are well established. It is not yet known what impact Article 89 will have on the local economy. It is anticipated that this zoning article will allow for small scale agriculture production that fits within an already densely populated city, on vacant lots and rooftops. There is a very limited amount of open space in a dense city for which the highest and best use would be large scale farming or forestry.

Employment Trends

The *MetroFuture Regional Plan* provides projections for the region. It notes that in 2030, the region's economy may add 293,000 jobs from 2000. Half of the net jobs will be in Professional and Business Services, Education, and Health Services. Manufacturing is the only sector that is expected to decline and 46,000 manufacturing jobs may be lost.

Environmental Justice

Environmental Inequity

MAPC's *State of Equity in Metro Boston* document addresses equitable access to open space. The report stated that an analysis of the quantity and accessibility of open space indicates that urban children have worse access to parks than suburban children. It referenced areas of Boston that provide fewer than 10 acres of open space per 1000 residents. It pointed out an issue of unsafe play

equipment in Boston in playgrounds in neighborhoods with higher concentrations of minority residents, higher rates of youth poverty and higher percentages of residents without high school degrees. The report mentioned that some communities are also plagued by crime and violence that prevents residents from enjoying open space.

The *State of Equity in Metro Boston* report called for land use decisions that provide equitable access to open space and address issues of safety. MetroFuture Goal #23 addresses environmental justice and states that "all neighborhoods will have access to safe and well-maintained parks, community gardens, and appropriate play spaces for children and youth. Even as density increases, MetroFuture will protect and enhance access to open space. The region will…focus on areas currently underserved by open space." Such improvements will not only help children, but will also meet MetroFuture Goal #25 - that all of the region's residents build more physical activity into their lives.

The *Boston Indicators Project* notes that communities of color and low-income neighborhoods in Boston shoulder a disproportionate share of environmental and environmental health burdens. A 2005 study directed by Professor Daniel Farber of Northeastern University documented cumulative exposures to 17 different types of environmentally hazardous sites and facilities, and found 9 in Boston neighborhoods, particularly in communities of color. As a result, Boston was ranked among the 20 most environmentally overburdened communities in Massachusetts.

Similarly, analysis by the Boston Public Health Commission finds that people of color in Boston have higher rates of health problems that reflect environmental conditions such as lead poisoning and asthma.

Community Setting

Environmental Equity

In 2002, the Executive Office of Environmental Affairs enacted its Environmental Justice Policy. The definition of environmental justice is based on the principle that all people have a right to be protected from environmental pollution and to live in and enjoy a clean and healthful environment. Environmental justice is the equal protection and meaningful involvement of all people with respect to the development, implementation and enforcement of environmental laws, regulations and policies and the equitable distribution of environmental benefits.

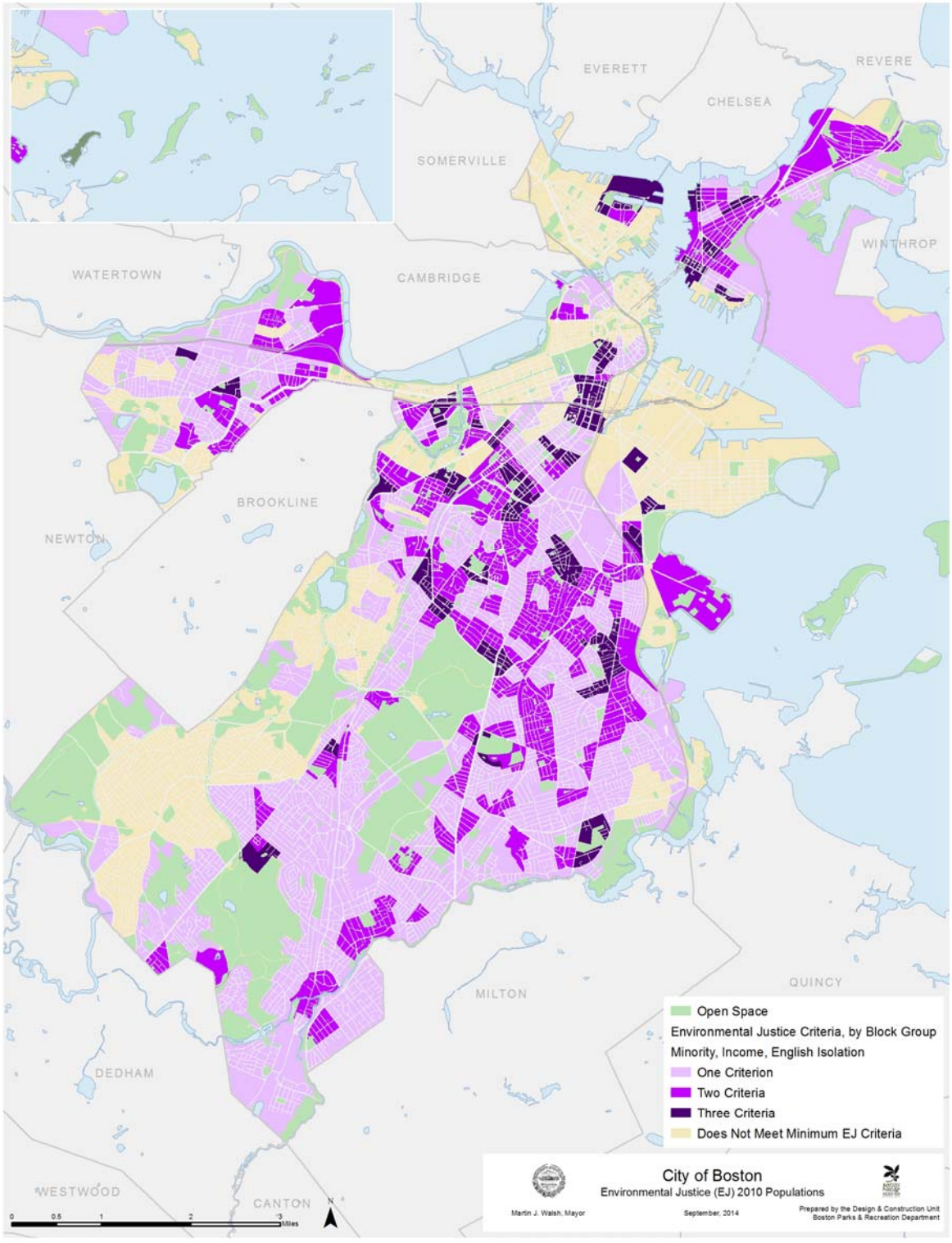
It is the policy of the Executive Office of Environmental Affairs that environmental justice shall be an integral consideration to the extent applicable and allowable by law in the implementation of all EOEA programs, including but not limited to…the provision of access to both active and passive open space.

Environmental Justice Communities are those segments of the population that EOEA has determined to be most at risk of being unaware of or unable to participate in environmental decision-making or to gain access to environmental resources. They are defined as neighborhoods that meet one or more of the following criteria:

- The median annual household income is at or below 65 percent of the statewide median income for Massachusetts; or
- 25 percent of the residents are minority; or
- 25 percent of the residents are foreign born, or
- 25 percent of the residents are lacking English language proficiency.

Environmental Justice Areas of Boston

Boston is one of the 20 communities in Massachusetts that meets all four criteria for being defined as an environmental justice community. There are 559 Census Block Groups in Boston, of which 396 Block Groups fit the Environmental Justice criteria (70.8% of the block groups). The total population of Boston in 2010 was 617,603. The total population of Boston that fell within an Environmental Justice Block Group was 456,403 or 74% of the population of Boston.



Map 2: Environmental Justice Populations, Boston

Community Setting

The neighborhoods that meet the minority population criteria include all of East Boston, portions of the South End, Roxbury, Mattapan, Dorchester, Mission Hill, Jamaica Plain, Roslindale and Hyde Park. The areas that meet both the minority and income criteria include portions of Roxbury, Dorchester and Mattapan. The areas that meet the minority and English isolation criteria include portions of Dorchester. The areas that meet all four criteria include portions of the South End, Roxbury, Mission Hill and Dorchester.

Demographics

The demographic information regarding the environmental justice populations in Boston with regard to race, income, immigration and foreign language spoken are discussed above in the section on Population Characteristics.

Section 3.4: GROWTH AND DEVELOPMENT PATTERNS

Please note that the City of Boston does not have a Master Plan to inform this section.

Summary of Boston's Development

Section 3.2 History of this plan presents the historic growth and development of Boston, and discusses the provision of open space over time. This section will therefore focus on growth since 2000. The BRA reports the following growth in Boston in the period between 2000 - 2010:

- Housing permits were issued for 19,070 units, of which 5,468 are affordable. The 8.3% growth of Boston's housing stock between 2000 and 2010 is the strongest in more than half a century. This growth has led the largest housing stock in Boston's history.
- 29 dormitories and nearly 11,000 dormitory beds, an increase of 39% since 2000.
- 11 non-residential higher-education projects with a total of 655,400 square feet.
- 9.8 million square feet of office space.
- 4,970 hotel rooms (35%) since 2000.

Census data indicates that the five neighborhoods of Boston that experienced the greatest growth in population between 2000 and 2010 include the South End with 22.9%, Central Boston with 22.7%, Fenway with 14.9%, South Boston with 12.4%, and Charlestown with 8.2%. The five neighborhoods that experienced the greatest decline in population between 2000 and 2010 include North Dorchester with -1.4%, South Dorchester with -5.4%, Roslindale with -6%, Mattapan with -8% and the Harbor Islands with -16.4%.

Community Setting

Current Land Use

The Metropolitan Planning Council (MAPC) classifies Boston as a Metropolitan Core Community. These municipalities have a historic, high-density, urban character, with a range of housing from traditional triple-deckers and row houses to large multifamily buildings. New growth occurs mostly through redevelopment, infill, or conversion from industrial uses to residential or mixed uses. Minority, immigrant, and low-income populations comprise a large share of the population.

Boston has a land area of 48.4 square miles. The BRA notes that overall land distribution in Boston is as follows: 51% tax exempt, 36% residential, 9% commercial, and 4% industrial. The tax-exempt land is 26% state, 14% city, 2% higher education and medical, 8% other exempts. The BRA notes that 16% of the land in Boston is dedicated to public open space, though it is not clear if this includes open space that is protected in perpetuity.

The current land uses in each neighborhood of Boston are described below.

Downtown - The BRAs 2013 map of the *Neighborhoods of Downtown* indicates that the land use is predominantly mixed use and commercial, with significant government and institutional uses. Dense residential neighborhoods exist in the North End, Beacon Hill, Back Bay and Bay Village. Industrial uses and residential uses are along the waterfront. Institutional uses such as the Museum of Science lie to the northwest of this neighborhood, as well as Mass General. Significant open space is provided throughout these neighborhoods, with Boston Common and the Public Garden, City Hall Plaza, the Charles River Reservation, Rose Kennedy Greenway, Christopher Columbus Park, and the waterfront parks of the North End, including Copp's Hill Terrace and Copp's Hill Burying Ground (what remains of one of the original hills of Boston).

Back Bay - The BRA's 2013 map of the *Neighborhood of Back Bay* indicates fine grained residential uses north of Boylston Street and commercial and institutional uses south of it. The significant open spaces in this neighborhood include the Commonwealth Avenue Mall which defines the center of the neighborhood, and extends the Emerald Necklace from the Public Garden, the Charles River

Esplanade, Charlesgate, and the Back Bay Fens. South of Boylston are Copley Square, the Christian Science Plaza, and the Southwest Corridor Park.

Fenway - The BRA's 2014 map of the *Neighborhood of Fenway*, indicates the land uses are commercial around Fenway Park, residential along the Back Bay Fens, and predominantly Institutional throughout much of the neighborhood. The Back Bay Fens and the Riverway extend the Emerald Necklace.

Mission Hill - The BRA's *Map of Mission Hill* indicates that the land use is predominantly residential uses and institutional uses. Significant open spaces include McLaughlin Playground, Jefferson Playground, Mission Hill Playground and Kevin Fitzgerald Park, and Back of the Hill Urban Wild. The boundary shared with Brookline is entirely made up of the Emerald Necklace, specifically the Riverway and Olmsted Park.

Jamaica Plain – The BRA's 2013 map of the *Neighborhood of Jamaica Plain* indicates a neighborhood defined by residential use, and large amounts of open space. The open space continues the Emerald Necklace and includes Olmsted Park, Jamaica Pond, the Arnold Arboretum, and Franklin Park. Other open space uses include Hellenic College, Allandale Woods, the Showa Institute, Daughters of Saint Paul, and Lawrence Farm.

West Roxbury - The BRA's 2012 map of the *Neighborhood of West Roxbury* indicates that the land use is primarily residential. Significant open space exists in this neighborhood, much of it adjacent and connected. The open space uses along the northwest boundary of the neighborhood include Leatherbee Woods, Hancock Woods, Mount Benedict Cemetery, St. Joseph's Cemetery, Mount Lebanon Cemetery, Gethsemane Cemetery, Brook Farm, Millennium Park and the Charles River. The open space uses long the southern part of the neighborhood include the West Roxbury Quarry and Billings Field.

Roslindale and Hyde Park - The BRA's 2014 map of the *Neighborhood of Hyde Park* and the map of Roslindale indicates land uses that are predominantly residential. A significant amount of open space uses include Bellevue Hill Reservation, Stony Brook Reservation, George Wright Public Golf Course, the Mill Pond Reservation at

Community Setting

Mother Brook, the Neponset River Reservation and numerous public playgrounds, urban wilds and private cemeteries.

Mattapan - The BRA's 2014 map of the *Neighborhood of Mattapan* indicates a very densely developed neighborhood with commercial areas that follow main streets. The significant green space uses include Franklin Park, Harambee Park, Almont hunt Playground, Walker Playground, Roberts Playground, Walsh Playground.

Roxbury – The BRA's 2013 map of the *Neighborhood of Roxbury* indicates land uses that are predominantly high density residential uses with small scale commercial along main street corridors. The open space uses include the Southwest Corridor, Carter Playground, Ramsay Park, Clifford Playground, Malcolm X Park, Highland Park, Marcella Playground, Hannon Playground and Ceylon Park. This neighborhood borders Franklin Park.

South End – The BRA's 2013 map of the *Neighborhood of South End* indicates that the land uses are predominantly residential north of Harrison Avenue, and institutional and commercial south of Harrison Avenue. The open space uses include the Southwest Corridor Park, Titus Sparrow Playground, Peters Park, Blackstone and Franklin Squares, South End Burying Ground and Rotch Playground.

Dorchester - The BRA's 2014 map of the *Neighborhood of Dorchester* indicates a very densely developed neighborhood with commercial areas that follow main streets. . Institutional uses include UMass Boston. The significant green space is along the Neponset River, including the Pope John Paul II Park, Dorchester Park, Garvey Playground and Tenean Beach. Savin Hill Beach, Malibu Beach, McConnell Park, Savin Hill Park and William T. Morrissey Boulevard are green spaces along Dorchester Bay. Other parks include Doherty Playground and Ronan Park.

South Boston – the BRA's 2014 map of the *Neighborhood of South Boston* indicates that the land uses are predominantly fine grained residential for the southern half of the neighborhood. This is immediately juxtaposed by the land uses on the north half of the neighborhood which are commercial, industrial and public use on the north half of the neighborhood along the northern waterfront. This area includes the Innovation District, Convention Center, World trade Center and Boston Marine Industrial Park.

Community Setting

The south half of the South Boston neighborhood has significant open space including Moakley Park, William J. Day Boulevard, Marine Park and Castle Island along the southern waterfront. Dorchester Heights and Christopher Lee Playground are the other large open spaces located in a very densely developed residential neighborhood. The north half of the neighborhood has some open spaces that are currently being provided, or are planned as future infrastructure to serve the build out of the neighborhood. These open spaces will be provided through the BRAs ongoing development of this neighborhood.

*East Bosto*n - The BRA's 2014 map of the *Neighborhood of East Bosto*n indicates that majority of this neighborhood is consumed by Logan Airport. Industrial uses follow the waterfront. Residential uses are to the west of the peninsula, and to the north at the boundary with Revere. Large open spaces include Belle Isle Marsh Reservation, Constitution Beach, and Wood Island Bay Marsh.

Charlestown - The BRA's 2013 map of the *Neighborhood of Charlestown* indicates that the land use includes government uses to the north, industrial uses to the north and along the waterfront, a fine grained mix of residential uses across the neighborhood, and significant open space such as Ryan Playground, Barry Playground, Charlestown Navy Shipyard parks and playgrounds, Paul Revere Park, Bunker Hill Monument, and many smaller parks, playgrounds and historic burying grounds.

Allston and Brighton - The BRA's 2012 map of the *Neighborhoods of Allston and Brighton* indicates that the land use is predominantly residential, with commercial uses along Brighton Avenue. Some commercial and industrial uses are set into the green space along the Charles River Reservation. Institutional uses include Boston College along the Newton boundary, and Boston University and Harvard's Allston Campus along the Charles River.

The significant open spaces in Allston include the Charles River Reservation, the Harvard Campus, and Smith Playground. The major open space uses in Brighton include the Boston College Campus, Evergreen Cemetery, Chestnut Hill Reservoir, Cassidy Playground, Reilly Playground, Rogers Park, Saint John's Seminary, Chandler Pond, and The Cenacles.

Community Setting

Zoning

Boston Zoning designates land use through both citywide districts and special districts. Citywide districts apply the same rules for the same uses: a single-family residential district in one neighborhood will get the same treatment as one in another neighborhood.

Special districts are specific to certain areas because of the particularities of the area or because a certain land use pattern is desired in a specific area for economic development or other reasons of public benefit. There are several citywide districts: Industrial Districts, Commercial/Office/Business Districts, Institutional Districts, Residential Districts, and Open Space Districts.

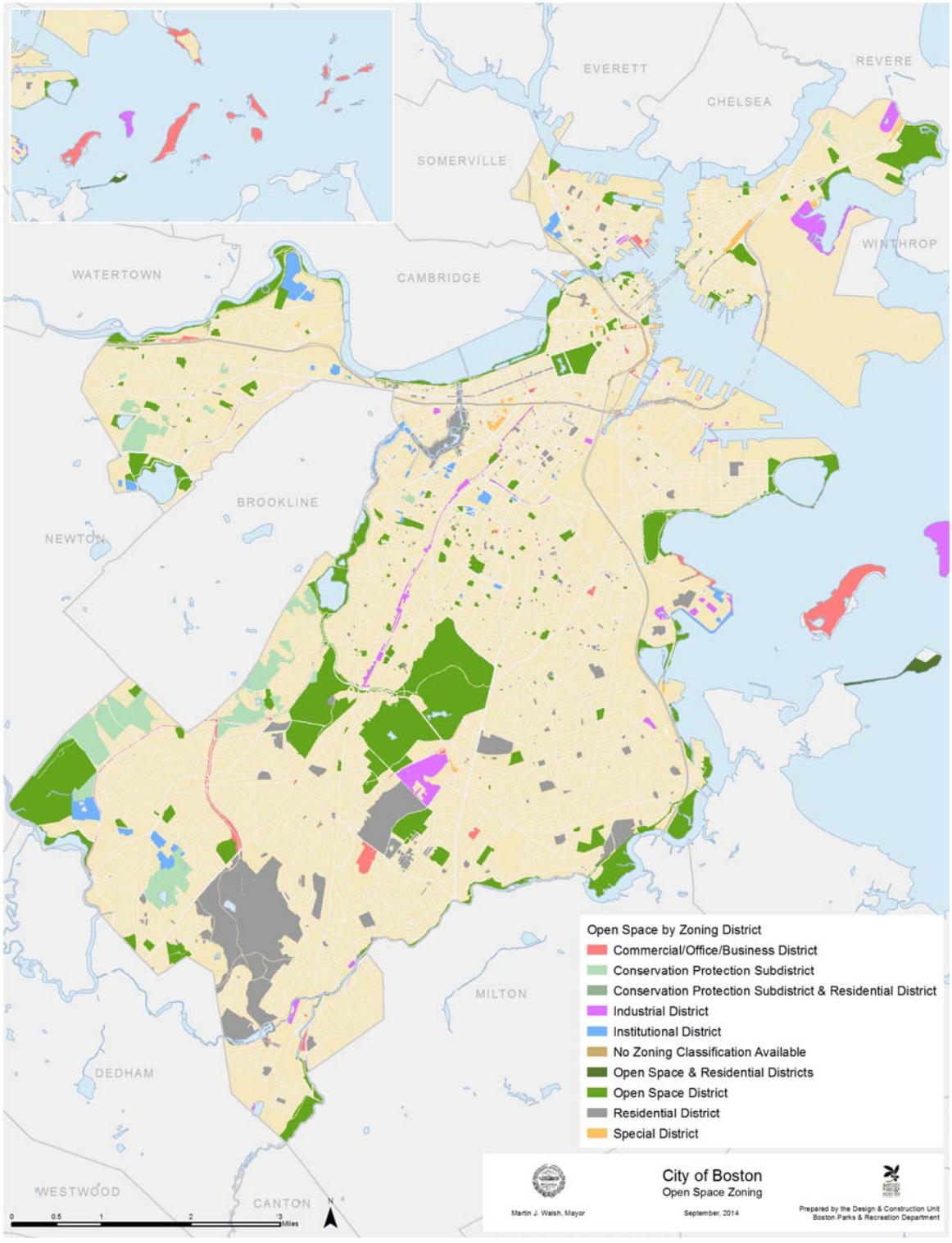
Open Space Zoning

Open space zoning is generally designated for lands in public ownership that are currently used for open space purposes. This zoning class can provide an additional level of protection to lands protected by Article 97. Open space zoning prohibits or limits to varying degrees the development of open space lands. The type of open space typically governs what degree of development can be allowed. The Open Space-Urban Wild subdistrict allows far less development than the Open Space-Urban Plaza subdistrict.

The protection of open space zoning has limitations, as zoning is subject to change, and variances and special permits may be granted, allowing development or alternative use of open space lands which may not be in accord with the goals of, or intentions for, the open space.

A project that does not meet the zoning requirements may seek a variance from the Zoning Board of Appeal. The Parks and Recreation Department tracks these requests for variances through the BOA as neighborhoods with growing densities are seeing an increase in buildings that maximize and exceed the zoning, and seek relief from the minimum onsite open space requirements, thus putting pressure on existing open space.

It is important to note that many, if not most, of the privately-owned open spaces in the city are not zoned for open space use, but rather for residential, industrial, institutional, or commercial use,



Map 3: Zoning of Open Spaces, Boston

and are therefore not protected by zoning. Private owners may have their property zoned for open space if they so desire.

The zoning code has several articles that relate to open space.

Municipal Code Section 7.4-11 Permission for Construction Near Parks or Parkways

The City's Municipal Code requires that the Parks and Recreation Commission shall provide written approval of construction or alteration of all buildings and structures within 100' of a public park or parkway. Depending on the scale of the project, this design review is conducted administratively and through the monthly hearings of the Parks Commission.

Historically, this review has occurred at the end of the Article 80 approval process, which often makes it difficult to make changes that would benefit the park in question. Staff has recently begun to be more engaged with BRA staff at the beginning of the Article 80 review, to ensure that impacts to parks are being identified and mitigated through that process. A second issue is that compliance is difficult to monitor with the current staffing levels.

Article 17 Open Space Requirement for Residences

New residential uses may be required to provide a minimum usable open space per dwelling unit on the project site. This space shall be maintained for lawful uses other than off street parking. This requirement may be met by balconies or on the roofs provided that accessible space on roofs are part of a Green Roof Project with no more than 25% of the green roof area physically accessible to the intended occupant. Front, side, and rear yards required by this Code shall be included in computing usable open space.

Meeting the minimum usable open space per dwelling unit zoning requirement onsite has become a challenge in densely developing neighborhoods like South Boston where developers are maximizing the development on a site and seeking variances by which to do so, including seeking relief from the minimum onsite open space requirements. This puts pressure on existing open space in an already dense neighborhood.

The BRA will negotiate a community contribution to offset this impact in some instances, but this is not a formalized process at this time. The City of Boston does not currently have an in lieu of fee structure for the provision of open space, as many communities in places like Maine and Chicago have begun to institute.

Article 29 Greenbelt Protection Overlay District

The city has designated Greenbelt Protection Overlay Districts (GPOD). Development along these corridors, generally within 500' of the centerline of the right of way, requires the approval of the Parks and Recreation Department. The purpose of this article is to preserve and protect the amenities of the city of Boston; to preserve and enhance air quality by protecting the supply of vegetation and open space along the city's Greenbelt roadways; to enhance and protect the natural scenic resources of the city; to protect the city's Greenbelt roadways from traffic congestion and to abate serious and present safety concerns.

Article 33 Open Space Subdistricts

The open space district (OS) designation can be given to public lands, or to private property with the written consent of the owner. The open space designation can be given alone, or in conjunction with a subdistrict designation: community garden, parkland, recreation, shoreland, urban wild, waterfront access area, cemetery, urban plaza, or air-right. The open space district and nine open space subdistricts, taken together, present a comprehensive means for protecting and conserving open spaces through land use regulations.

The purpose of this designation is to encourage the preservation of open space and to enhance the quality of life of the city's residents by permanently protecting its open space resources; to distinguish different open space areas in order to provide for uses appropriate to each open space site on the basis of topography, water, flood plain, scenic value, forest cover, urban edge, or unusual geologic features; to prevent the loss of open space to commercial development; to restore Boston's conservation heritage of Olmsted parks; to coordinate state, regional, and local open space plans; to provide and encourage buffer zones between incompatible land uses and mitigate the effects of noise and air pollution; to promote and maintain the visual identity of separate and distinct districts; to

enhance the appearance of neighborhoods through preservation of natural green spaces; and to ensure the provision of adequate natural light and air quality by protecting the supply of vegetation and open space throughout Boston.

Article 49A Greenway Overlay District

This article established guidelines and design controls for parcels adjacent to the Rose Kennedy Greenway. The objective of the guidelines is to establish a set of design controls for these parcels that preserves the newly created open spaces environmentally and aesthetically; activates the broader public realm in and surrounding the parks; ensures the long term value of the public's investment in creating the Greenway; and balances the development pressures in the Greenway District with other growth areas and development opportunities in the City as a whole.

Article 56

Of interest to open space and environmental activists is a special type of residential sub-district, the Conservation Protection Subdistrict. As the city has gone through a slow re-zoning, neighborhood by neighborhood, the Conservation Protection Subdistrict (CPS) has become a presence in more parts of the city. These CPS zones are typically established on large privately-owned tracts that possess some natural features deemed worthy of protection and preservation. Rather than use the standard residential zoning that as-of-right allows for demolishing of natural features for the sake of constructing housing if the final structure remains within a spatial envelope outside the front, rear, and side yards, the CPS zones mandate that the site plan be reviewed first by the Boston Redevelopment Authority (BRA) planners. These planners will look to see if the site plan protects large-diameter trees, stream beds, wetlands, and other natural features, wherever they appear on the site. In exchange, the CPS zone will allow higher density if the development envelope is significantly narrowed over what would be allowed by as-of-right zoning.

Community Setting

Article 80 Development Review

In 1996, the BRA adopted Article 80 to provide clear guidelines for the development review process relating to large projects (adding more than 50,000 square feet), small projects (greater than 20,000 square feet), planned development areas (new overlay zoning districts for project areas larger than 1 acre), and institutional master plans (projects relating to academic and medical campuses). Article 80 was adopted because these unique projects rarely fit neatly within the existing zoning code and a more predictable review process was needed. The Article 80 process allows for community involvement in the review process.

The Article 80 process is intended to protect and enhance the public realm and to mitigate the impacts of development projects on their surroundings and on City resources. The review process may include a project's impacts on urban design, affordable housing, employment, the economy, transportation, public realm, the environment, and historic resources, etc.

One of the specific goals of Article 80 is "to encourage new buildings and public spaces that are designed to enhance and preserve Boston's system of parks, squares, walkways, and active shopping streets." However, the Article 80 review criteria and requirements do not specifically require that a project consider its impacts to parks, or benefits to parks. There is no standard formula or criteria to determine how a particular development may impact or benefit the existing parks in the neighborhood.

The Parks Department has begun conversations with the BRA to formalize a set of review criteria for the provision of parks, as well as researching other communities around the country that have adopted standard migration of impacts through in lieu of payments or impact fees. It is expected that this Open Space Plan will be used as the basis for future analysis during the Article 80 process.

The BRA may require that a developer provide open space as part of a community contribution negotiation for the project. However, at this time, this contribution of publicly accessible open space is not required to be protected in perpetuity, so the land that is provided to mitigate development is typically not permanent open space.

Community Setting

The BRA may approve a Planned Development Area for a project that codifies the development potential of a particular parcel through an extensive public process, review and negotiation. The end result is that the required provision of open space on a site may be changed during this approval. The Parks Department therefore must participate in the review process proactively to ensure that the project does not trade its open space requirements for other community benefits, and that the impacts are minimal to the neighborhood's open space infrastructure.

The BRA may also approve Institutional Master Plans that determine how a school or hospital will grow over a decade. There are no requirements for open space in this approval process. The IMP process also requires that residential needs be increasingly met on campus, thereby leading institutions to look to their open spaces as building sites. The desire for new integrated science facilities to train the workers of the future and to attract research funding also become priorities for development, putting further strain on tight urban campuses. Open space may be provided in the IMP, but a later amendment, or a future IMP may utilize that open space. There is no requirement that the open space be protected in perpetuity. The institution may them eliminate the open space that served its users, or look to the City's open spaces to serve its users, adding pressure to public spaces.

Article 89 Urban Agriculture

The City has recently adopted Article 89 that regulates the provision of urban agricultural activities in its neighborhoods, in order to meet a growing interest in producing foods locally and maximizing underutilized land. The purpose of this Article is to establish zoning regulations for the operation of Urban Agriculture activities and to provide standards for the siting, design, maintenance and modification of Urban Agriculture activities that address public safety, and minimize impacts on residents and historic resources in the City of Boston.

Current Zoning

The City of Boston's neighborhood Zoning Maps provides color for the areas with overlays, master plans, planned area developments, institutional master plans, etc. But the remainder of the designations on the zoning maps are not color coded, making it

difficult to analyze the zoning designation for an overview at a large scale. In general, it appears that the current zoning for open space in particular reflects the current land uses that were described above.

Areas on the current zoning maps that may be putting pressure on open space are as follows:

Institutional Master Plans – IMPS are being approved for institutions facing growth pressure in dense neighborhoods. In some instances no open space is required, or existing open space is being designated for development, thereby putting consequent pressure on public open space. These IMP areas include the hospitals in Fenway/ Longwood and along Harrison Avenue, Boston University along Commonwealth Avenue, Harvard in Allston, Boston College in Brighton, Northeastern in Roxbury, Wentworth in Mission Hill, and UMass in Dorchester.

South End - Numerous residential developments in the South End along Harrison Street, many of which are being developed with PDAs, and all of which are putting pressure on the limited open space resources in the neighborhood.

South Boston – Significant development in the residential neighborhoods of South Boston, often maximizing the development potential and seeking variances to allow higher density and to not allow the minimum amount of open space on site.
South Boston Waterfront - The development of the South Boston Waterfront and the Innovation District should ensure that public open space that is provided through development agreements and planned development area agreements is protected in perpetuity.

Roxbury - Numerous residential and mixed use projects are being approved and constructed in Roxbury along Tremont Street and the Dudley Square area, many of which are being, or will be, developed under Planned Area Development Agreements. Residential developments should be considered for the impacts they will have to the neighborhood's open spaces.

Charlestown - The potential development that will be created by the realignment of Sullivan Square will create seven parcels of land to be developed through the Article 80 process. It is important that

permanently protected, public open space be provided through this development.

Current Infrastructure

Boston was originally contained on a peninsula of about 1.2 square miles which was densely populated. Its early infrastructure of roads, water and sewer, and greenspace grew as the land grew, to support development on new land. The city remains small and is less than 50 square miles. Boston is the most populated city in New England with over 600,000 residents. Over a million additional people enter Boston each day to work, attend school, or visit.

Boston's land use is compact, mixed-use, pedestrian-oriented and well served by transit. Land is at a premium and development competes with open space in a crowded urban environment. The infrastructure systems necessary to support a dense city include multi-modal transportation, electrical services, gas lines, water and waste systems and greenspace. Achieving a balance of gray infrastructure that allows for growth, and green infrastructure that maintains a quality of life, requires a balance of public policy.

This section will look at transportation and water use / water treatment, and in particular will focus on the impacts of this gray infrastructure on the provision of green infrastructure.

Water Transportation

Natural water bodies provided the first infrastructure of Boston. The rivers and tides provided transportation routes, sources of food, power for mills, and places of sewage disposal. The coastline and rivers guided the movement of Native People throughout the seasons. The European settlers crossed the Atlantic Ocean, and continued to master this water body for expansion of development, and worldwide commerce. The East Coast became a well-traveled route as people used small shallop boats to move between settlements. The rivers provided inland routes to the establishment of new communities.

The sea and the harbor continue to be important avenues of international commerce, although Boston's share of this trade has fallen behind other port cities such as New York and Montreal. Today cruise liners calling in Boston are a bigger business than

container ships. Harbor channel maintenance dredging under the direction of the US Army, Corps of Engineers was completed in 2008. The next project is a channel deepening project that enables larger container cargo ships to enter the Port of Boston.

European settlers created ferries and then bridges at the places Native People used to cross rivers. In recent years the city has revived and expanded the water ferry system. In a region defined by its access to water, ferry service will become an alternative to clogged highways and packed transit trains as population and development densities continue to increase.

The Boston Harbor Islands park system adds to the demands for water transportation. Lowering the cost of the private ferries to enable a broader range of passengers to access the islands will be an ongoing concern of Harbor Island Park management.

Streets, Roads and Highways

As discussed in *Section 3.2 History*, the Native People had a hierarchy of alternate paths throughout the region that responded to topography, landforms sun and shade. The European settlers first adopted these paths, and eventually augmented them, before then imposing straight line rangeway roads. Early roads in Boston were often created around landforms that may no longer be in existence, creating ancient streets that seem convoluted in the absence.

Ferries and then bridges were developed at the fording places of the Native Peoples.

Boston's colonial-era streets have grown into an 800 mile network that varies from narrow cobblestone alleys on Beacon Hill dating back several centuries to the massive Big Dig. The highways that serve the city include Interstates 90, 93, and 95; Massachusetts Routes 2, 3, 9, 24, and 128; and US Routes 1 and 3.

As the ownership of privately owned vehicles increases, the burden of ever-growing traffic adversely impacts on the quality of life in the city, as well as in the surrounding metropolitan area. From residential neighborhoods where merchants and residents call for more parking to the heavily-used Interstate Highway System that cuts through and surrounds Boston, the conflict between personal

choices and public good remains unresolved. Roads are an important spoke of the transportation wheel serving Boston. At the same time, traffic delays and air, water, and noise pollution are constant reminders of the cost of such a transportation system.

Bridges and Tunnels

The bridges and tunnels that serve the city include the Callahan Tunnel, the Sumner Tunnel, the Ted Williams Tunnel, The Thomas P. O'Neill Tunnel, the Tobin Bridge, and the Zakim Bridge.

The Central Artery/Tunnel Project (the "Big Dig") removed the elevated Central Artery and created a new highway tunnel through downtown. It was the largest, most complex and costliest highway and tunnel project in the nation's history. This project created a total of 300 acres of new and restored open space, including 45 open parks and major plazas.

Mass Transit

Railroads were first built in Boston during the 1830s. Railroad tracks required flat, filled land along waterways, spurring the addition of made land in Boston. This technology made possible the extensive filling in of tidal flats, and the creation of new land for neighborhoods.

Boston residents were served by horse drawn buses since colonial times. By the late 1800s, rails were used to convey horse-drawn trolleys that later became the routes of electrified trolleys and subway lines. Streetcar suburbs grew along trolley lines in Roxbury, Brighton, Dorchester, and other areas around Boston.

Boston developed the first subway system in the country. The MassDOT FY2014 Transportation Capital Investment Plan notes that the Massachusetts Bay Transportation Authority (MBTA) is the 5th largest transit system in the country as measured by ridership. It serves a daily ridership of approximately 1.3 million passengers. It maintains 182 bus routes, 4 rapid transit lines of heavy and light rail, 5 bus rapid transit lines, 3 trackless trolley lines, 14 commuter rail lines, 3 ferry routes, and a flexible paratransit service.

Community Setting

Air Travel

Air travel in Boston developed in the last century when Logan International Airport started during the 1920s on the mud flats of East Boston. The neighborhood was originally composed of five separate islands. Significant fill has created the land mass that exists today. Frederick Law Olmsted designed Wood Island Park in East Boston which was completed in 1895. This park was sacrificed for airport expansion in the 20th century.

Logan International Airport is a critical link between the Northeast and the rest of the world. A significant increase in business has resulted in additional expansion. Recent additions to the airport include a runway built in 2006, new terminal buildings and a parking garage, circulation improvements, hotels and a third harbor tunnel to increase vehicular access.

Massport has built and maintains Piers Park as part of its efforts to mitigate negative impacts on surrounding communities, especially East Boston. The 10-acre Bremen Street Park opened in 2007, adjacent to the Airport MBTA stop on a former rail yard. This park was funded by the Massachusetts Turnpike Authority and is maintained by Massport.

Pedestrians and Bicycles

MassDOT's *Capital Investment Plan for FY2014-FY2018* notes that $144 million will be provided for the construction or reconstruction of bikeway and bike path improvements, including rail trails and scenic byways, across the Commonwealth.

The Boston Regional Pedestrian Transportation Plan identifies actions that local governments, advocacy organizations, citizen groups, the private sector and individuals can take to encourage walking.

Hubway is a public bicycle sharing system with stations throughout Boston and adjacent towns.

MAPC has a Regional Bicycle plan and a Regional Pedestrian Plan.

Community Setting

Water Infrastructure

The water infrastructure is the responsibility of two public agencies: the Massachusetts Water Resources Authority (MWRA) and the Boston Water and Sewer Commission (BWSC).

Water services had a modest beginning in colonial Boston. Early settlers relied on water from cisterns and underground wells, but the quality was poor and the supply inadequate. The first attempt to provide an alternative came from a private company; in 1796, the Aqueduct Corporation began delivering water from Jamaica Pond through a system of wooden pipes.

In 1848, Boston obtained its first municipal water supply from Lake Cochituate via the Cochituate Aqueduct and the Brookline Reservoir. In order to meet the growing needs of Boston and the necessary system expansion, construction began in 1866 on the Chestnut Hill Reservoir. Construction of reservoirs on the Sudbury River to feed the Chestnut Hill Reservoir through the Sudbury Aqueduct soon followed. The Metropolitan Water District was formed in 1895 and by 1908 the Wachusett Dam, Reservoir, and Aqueduct were completed.

By the early 1900s, it was apparent that the Boston metropolitan area required additional water supplies and a more comprehensive plan to ensure its delivery. The MDC Water Supply Division was created in 1926 as a solution to this problem and was responsible for building many MDC facilities, among them Quabbin Reservoir, the Quabbin Aqueduct, and the Hultman Aqueduct. (A 17-mile MetroWest Water Supply Tunnel is now under construction. It will provide backup to the nearly 60-year old Hultman Aqueduct.)

Today, the MWRA supplies water to Boston and 60 other communities, where 2.5 million people are served in 890,000 households. Some 230 million gallons daily comes from the Quabbin Reservoir which is 65 miles west of Boston, and the Wachusett Reservoir which is 35 miles west of the city. From there the water is conveyed via aqueducts from the two reservoirs to the Weston and Norumbega reservoirs where it is held for delivery.

Community Setting

MWRA water reaches Boston after passing through treatment plants, storage tanks, and aqueducts. The Boston Water and Sewer Commission delivers the water. BWSC owns and operates a system for the distribution of drinking water to customers throughout the city. BWSC purchases water (disinfected and fluoridated) from the MWRA. BWSC is the MWRA's largest single customer for both water and sewer services.

The BWSC's water distribution system consists of approximately 1,096 miles of pipe which range in size from 4 inches to 48 inches, including almost 17 miles of high pressure fire service pipe located in downtown Boston, 13,074 hydrants, and 16,885 valves. The system serves approximately 88,000 accounts through four major service networks.

Sewer Infrastructure

BWSC owns and operates a system for the collection and transport of wastewater and storm drainage. The sewer system consists of conduits ranging in size from six-inch clay lateral sewers to 20-foot by 15.5-foot concrete culverts. The 1,450-mile system has 600 linear miles of sanitary sewers, 550 miles of storm drains, and 300 miles of combined sewers. Other facilities include eight pumping stations, two gatehouses, 40 permitted combined sewer overflow outlets, 185 regulators, and 200 tide gates.

In 1985, legislation transferred the possession, control, and operation of the MDC Water and Sewerage Divisions to the newly created Massachusetts Water Resources Authority. Today, all wastewater collected by BWSC facilities are conveyed to the MWRA's Deer Island Treatment Plant for both primary and secondary treatment. The MWRA has created a 44-acre park that surrounds the plant, thus offering a harbor island experience accessible by land.

The Deer Island Treatment Plant is part of the cleanup of Boston Harbor that was ordered by a federal court. The MWRA and its predecessor agency, the Metropolitan District Commission, were found in violation of both state and federal clean water laws. The court ordered the MWRA to build the wastewater and sludge facilities as well as improved combined sewer overflow facilities, all on a court-set schedule.

Community Setting

These sewer renovations and the wastewater and sludge treatment made up the largest public works project ever to be built in New England up to that time and had a final cost estimated at up to $6.1 billion (the Central Artery/Tunnel Project was finished later, and cost considerably more). This massive undertaking included a 9-mile effluent tunnel to carry treated water hundreds of feet below Boston Harbor and into Massachusetts Bay.

The scope of this undertaking is driven by the 2.5 million people, almost half of the state's population, and the 5,500 businesses and industries that send their waste to Boston Harbor. It is also driven by the vast scope of the Boston waterfront, where commercial, residential, and recreational interests have been positively affected by the cleanup of the harbor waters. The DCR harbor beaches are completing a rebuilding program to accommodate projected increases in their use as word spreads of the cleaner harbor water.

Two former sewerage works under BWSC control hold potential for open space use: Calf Pasture in Dorchester, along Dorchester Bay, and the Moon Island facility, which may hold promise for future use as part of the Boston Harbor Islands park system.

Future Trends

In 2014, MAPC released a report entitled *Population and Housing Demand Projections for Metro Boston*. This document provides projections for Metro Boston through 2040 in order to help municipalities form policies that will ensure that the region will continue to grow.

The aging and retirement of the Baby Boomers will have profound implications for the region, and that the economic future depends on attracting more young workers from other places. The report states that 435,000 new housing units--mostly multifamily, and mostly in urban areas--will be needed by the year 2040 to accommodate these young workers and the growing senior population.

Community Setting

The report offers two possible scenarios – "Status Quo" and "Stronger Region." The Status Quo scenario is based on the continuation of existing rates of birth, death, migration and housing occupancy. The Stronger Region scenario explores how changing trends could result in higher population growth, greater housing demand, and substantially larger workforce.

The reports key findings are below:

Population - The Status Quo Scenario assumes a population growth of 6.6% over thirty years. The Stronger Region projects a 12.6% growth in population.

Workforce - More than a million of the workers in the region will retire by the year 2030. Young people will need to be retained and attracted from other places in order to fill the jobs. The Status Quo scenario notes that the current weak in-migration of younger workers will result in .4% growth in the labor force. The Stronger Region scenario projects that more young people will be attracted from away and retained, adding 175,000 new workers to the labor force and growing it by 7%.

Housing - Under the Status Quo scenario, the need for new housing will increase with a need for 305,000 new housing units by 2040. Under the Stronger Region scenario, there will be a need for 435,000 new units.

Households - There will be a need to provide housing for a growing number of households of declining size due to single person households (especially seniors), divorced households, and fewer children. An increasing percentage of senior-headed households will choose to downsize from single family homes, to apartments and condominiums. The sale of single family homes by the aging Baby Boomer generation will provide an adequate supply for younger families.

Housing Preferences - Attracting more young people to the region with the kinds of housing they prefer could result in a "Stronger Region" scenario with a total population increase of 12.6%. This report confirms the need for significant new rental and homeownership multi - family housing to attract young people. The Status Quo scenario will require 48% of the units to be multi-

family in urban communities. The Stronger Region scenario will require 62% of the units to be multi-family.

Many signs point to the resurgence of inner core urban communities. An increasingly diverse population attracted by job proximity, transit access, vibrancy, and cultural assets is likely to drive continued population growth in inner urban areas. More than half of housing demand will be in urban communities under either scenario — as much as 56% in the Stronger Region scenario.

Children - The number of children in the region and in most municipalities peaked in 2000 and is likely to decline over the coming decades. The population aged 5 to 14 is projected to fall another 8% to 9% by 2020 and is not likely to fully rebound, even under the Stronger Region scenario.

Economy - MAPC's *2012 to 2013 Annual Update to its Comprehensive Economic Development Strategy* includes trends in the Boston Metropolitan Regional Economy. It notes that in the colonial era, the region focused on international trade and building global connections. The economic security that resulted allowed governance that supported growth and universities that ensured an educated population. As manufacturing increased, there was greater investment in education, cultural institutions and physical development that enhanced the quality of life. The region is now undergoing an economic transition with core strengths in education, healthcare and finance that form the basis of an innovation and knowledge economy. This new trend values creativity, innovation and production that turns new ideas into tangible products.

Climate Change

Other issues put pressure on open space, in addition to population growth and economy. The Boston Indicators Project notes that the city is among the most vulnerable in the US to climate change and rising seas. Models of ice-free status in the Arctic by 2050 are being revised to project open seas in a decade. Projections are for a 7 foot rise in sea level in a century. The report states that the Northeast coast is at a disproportionate risk compared to other coasts in the nation and world. The manner in which Boston chooses to address this issue can be closely tied to the provision and use of its open spaces.

Community Setting

Stormwater Best Management Practices

The Boston Water and Sewer Commission produced the *Stormwater Best Management Practices (BMP) Proposal and Guidance Document* in January 2014. Relevant to this Open Space Plan, this document calls for Green Infrastructure that uses storm water runoff management practices to mimic the natural hydrologic cycle. Site planning includes reducing the amount of directly - connected impervious areas, fitting the proposed improvements to the site terrain, preserving and using the natural drainage systems, and replicating pre-development hydrology.[vii] The Commission is currently working on the implementation of demonstration projects at Audubon Circle (Beacon Street/Park Drive area), Central Square in East Boston, and City Hall Plaza. The potential need to use open space to manage stormwater runoff is an issue that warrants further consideration of the Parks and Recreation Department.

Future Development

Boston does not have a Master Plan. The City's long term development is largely a function of the economy, the zoning and the amount of remaining, buildable land. The following areas are places where new development is taking place in Boston. There is a need to provide open space in a balanced manner to augment the build out in these neighborhoods.

A recent Boston Globe article entitled *New frontiers of Economic Growth in Boston* (by Casey Ross, 04/20/14) states "As a building boom transforms Boston's skyline, construction cranes have popped up in places where they haven't been seen in years. In East Boston, hundreds of new apartments are rising on a waterfront that also boasts revitalized parks and breathtaking views of downtown. Roxbury's Dudley Square is attracting interest from a wide array of local and national retailers promising to bring new life to a forgotten commercial district.

And in the South End, an industrial area is being transformed into a new neighborhood with hundreds of homes, a Whole Foods supermarket, and spaces for restaurants and stores. For the first time in decades, Boston's neighborhoods — and not just its downtown core — are benefiting from redevelopment that is creating new frontiers of economic growth. They are places that

always had loads of potential, but never attracted significant investment — until now."

Dudley Square, Roxbury

The Dudley Square commercial district at Boston's geographic core is changing rapidly. Five major developments are planned for the area around the square. Together, they will provide more than 700 new residences, several hotels, a supermarket, restaurants, stores, and offices. In addition to rehabilitating the Ferdinand Building, the city has built a new police station and renovated the public library branch.

Harrison Avenue, South End

A recent Boston Globe article entitled *New frontiers of economic growth in Boston* (by Casey Ross, 04/20/14) notes that this area of former industrial properties along Harrison Avenue and Albany Street has remained a no man's land for development until the last several months. In the next couple of years, two city blocks in the shadows of Interstate 93 will become host to million-dollar condominiums, the city's largest Whole Foods grocery store, and hundreds of luxury apartments.

Charlestown Navy Yard

Most of the Charlestown Navy Yard is a National Historic Park where visitors can board the USS Constitution. New residential properties and a marina mark the northern edge of the area. A branch of Massachusetts General Hospital and the new Spaulding Rehabilitation Hospital bring state-of-the-art healthcare into this historic neighborhood. The *Charlestown Navy Yard Waterfront Activation Network Plan* (2007) has an overarching goal to further activate the Yard's waterfront with uses for both local residents and visitors. Strategies include the creation of year-round public destinations; improved access, way-finding, and signage; and increased water-dependent uses such as sailing facilities, marinas, and water transit facilities.

East Boston

East Boston was originally composed of five separate islands, with saltworks established as early as the 1700s. By 1800, the islands

were linked to Boston by a ferry and became part of the City in 1822. From that point on, the islands became a prominent industrial and shipbuilding center. The Eastern Railroad Company promoted trade through rail access to the shipyards. During the same period, East Boston rivaled Ellis Island as a point of entry for immigrants to the United States. East Boston's current shoreline was created in the early 1900s by the consolidation of East Boston's five separate islands by landfill. The *2002 East Boston Municipal Harbor Plan* describes how new growth and economic development can occur within East Boston, while providing a framework for preserving the neighborhoods and their resources. The plan includes goals for Open Space and Public Environment.

A recent Boston Globe article entitled *New frontiers of economic growth in Boston* (by Casey Ross, 04/20/14) notes that more than 1,250 apartments and condominiums are approved for construction in coming years along the East Boston waterfront. The area's revival started in Maverick Square, where rehabilitation of the MBTA station and development of a neighborhood health center helped attract new retail and dining options. The Massachusetts Port Authority, which operates Logan International Airport, also helped create the East Boston Greenway, a string of parks that will eventually run from Constitution Beach to Piers Park. Public officials reviewing the plans are pledging that development of the new apartments and condos won't interfere with access to the harbor.

Downtown Waterfront

The Downtown Waterfront Planning Initiative is the next step in the implementation of the Rose Fitzgerald Kennedy Greenway District Use and Development Guidelines, which were adopted by the BRA in 2010 to preserve and activate the Greenway's open space resources and enhance connections between the Downtown's neighborhood districts and waterfront. The Greenway Guidelines will serve as the master planning framework for the development of a new Downtown Waterfront Municipal Harbor Plan (MHP) which will harmonize the Guideline's recommendations with the state's Waterways Regulations. The planning effort will also involve the development of a Waterfront Activation and Public Realm Plan, and zoning recommendations for the Greenway District corridor. To facilitate the harbor planning process a range of public benefits and mitigation offsets need to be advanced for

projects that propose building metrics that do not conform to Chapter 91 standards. A Downtown Waterfront Activation and Public Realm Plan will be developed as part of the planning effort to assist in this endeavor.

Harborwalk

Boston's Harborwalk program forms a continuous shoreline walking path and is one of the most important components of the City's waterfront revitalization program. The Harborwalk system connects the City's neighborhoods to its Harbor; leading recreational, cultural and historic attractions; and water transportation facilities. When completed, the Harborwalk will stretch over 47 miles from Dorchester to East Boston and connect to inland paths and trails, including the South Bay Harbor Trail (from Roxbury), Walk to the Sea (from the State House), and the Neponset and East Boston Greenways. Pursuant to the City's zoning code, new waterfront developments are required to setback buildings from the shoreline and construct a portion of the Harborwalk within that setback. This is to ensure waterfront access to pedestrians looking to enjoy the City's harbor views.

South Boston Waterfront

Much of the area now known as the South Boston Waterfront, or Seaport, was originally tidal marsh. Landfill activity was initiated in 1833, and the area became home to new land, piers, and channels. Eleven wharves were added to South Boston's port facilities. By the late 1880s, the Seaport was a bustling industrial center. As the industrial era quieted in Boston, the Seaport began to serve mostly as parking. However, the turn of the 20th century into the 21st saw a burst of redevelopment in the area, with residential, office, and tourism uses being constructed along the waterfront. The 2000 South Boston Waterfront Municipal Harbor Plan's primary goal is to ensure that the public has meaningful access to Boston Harbor along the Seaport's coastline. The 2009 amendment includes information about the 100 Acre Master Plan.

Seaport Square

The Seaport Square project will include 23 buildings on 20 blocks with approximately 6.5 million sf of development, including 2.8 million sf of residential, 1.3 million sf of office, 1.3 million sf of

retail and entertainment, 600,000 sf of cultural and educational uses, and 500,000 sf of hotel use. The FEIR indicates that the project will provide 2.35 acres of open space dedicated to passive and active parks, which is 10% of the total project site of 23 acres, and 6% of the total project area of 33 acres.

The Innovation District

The Innovation District, with 1,000 acres of under- or undeveloped land abutting historic Boston Harbor and downtown, is undergoing a dramatic transformation into a 24-hour neighborhood that fosters innovation, collaboration, and entrepreneurship. The area has grown rapidly over the past few years, adding over 4,000 new jobs in over 200 new companies, including many green-tech companies.

The City is committed to ensuring this is a sustainable neighborhood. Per Boston's zoning bylaws, all new development over 50,000 SF must be LEED certifiable. The District is home to five Hubway stations, and almost three miles of bike lanes with almost three more proposed for 2014. The Commonwealth of Massachusetts also recently announced plans to add train service connecting the neighborhood directly to the Back Bay and South Station, which will supplement the Silver Line, Boston's Bus Rapid Transit that currently connects Logan Airport to the Innovation District and downtown. Furthermore, as this neighborhood grows, so does the demand for energy. The City recently hired an Eco District Fellow to work between the City, the utilities and developers to bring district energy to the neighborhood. Not only will district energy reduce greenhouse gas emissions associated with the new development, but it will also increase the resilience of this waterfront community.

Boston Marine Industrial Park (BMIP)

The Boston Marine Industrial Park (BMIP) provides space for a wide array of marine related, industrial and light industrial, and other types of businesses. Long range plans for the BMIP call for a an additional 1.6 million square feet of leasable space comprised of a mixture of maritime industrial and related uses such as seafood processing, cruises, ship repair, bulk and break bulk cargo operations, storage and distribution, all supported by new and improved roadway and utility infrastructure, marine infrastructure and future direct rail access. Uses in non-water dependent areas

include general industrial, manufacturing, research and development and limited supporting commercial uses.

Fort Point Channel

The Fort Point area was first developed in the 1830s by the Boston Wharf Company and through the 20th century was one of the principal marketplaces for wool in the United States. Manufacturing and warehousing have since declined in Boston's, but the buildings have been preserved as a Landmarks District. Artists have begun moving into the area, converting many of the structures to studios and lofts. The area is also home to the Boston Children's Museum, the Boston Fire Museum, as well as art galleries and design studios.

The 2002 Fort Port Channel Watersheet Activation Plan looks at ways to activate the calm water along the channel through public realm improvements and the development of water dependent uses. The 100 Acres Master Plan provides a framework for transforming the existing surface parking lots to a vibrant 24-hour, mixed-use neighborhood anchored by over 11 acres of new public open space and almost 5.9 million square feet of development.

Institutional Master Plans

The Article 80 Institutional Master Plan (IMP) Review ensures that the expansion of a hospital or university enhances the institution's public service and economic development role in the surrounding community and city. Recently, the BRA reviewed and approved the master plans for institutions such as Harvard University's Allston Campus, Northeastern University, Boston University, Boston College, Wentworth College, Boston Medical Center, and others.

As institutions evolve, incremental changes to a campus can add up to a much greater impact on surrounding communities. The process of creating Institutional Master Plans ensures that campus evolution occurs in a thoughtful and transparent manner. An Institutional Master Plan is a comprehensive development plan that describes an institution's existing facilities, long-range planning goals, and proposed projects. IMPs also identify potential impacts on surrounding communities, and outline proposed community benefits.

Community Setting

Generally, IMPs are renewed every ten years and reviewed under the BRA's Article 80 process. In addition, an institution must update, renew, and amend its Institutional Master Plan whenever it adds or changes any project over a minimum threshold. Each of these planned projects will go through its own Article 80 review.

The BRA released a Boston by the Numbers fact sheet in March 2011 that included the following development of campus buildings and dormitories:

- Eleven large non-residential higher education projects were completed with a total of 655,400 sf of space during 2007-2010.
- In 2011, three projects with 721,200 sf of space were under construction.
- Since 2000, Boston has added 29 Dormitories and nearly 11,000 beds.
- In 2011, there were four dormitories with 2200 beds in the planning phase.

Talbot-Norfolk-Triangle

The Talbot-Norfolk-Triangle neighborhood (TNT) has traditionally been an underrepresented, economically disadvantaged section of the Dorchester neighborhood. However, partially fueled by a new transit corridor—the Fairmont Line—TNT is home to a growing grassroots sustainability revitalization. The TNT neighborhood is striving to achieve a LEED-ND Platinum rating. The project has the following sustainability goals:

- Retrofit at least 15% of TNT existing housing to save residents money on energy related costs.
- Build at least one new, highly efficient mixed-use transit-oriented development (TOD) project.
- Explore local power generation models and incorporate that capacity into new and existing TOD mixed-use housing developments and other local projects.
- Construct and program new green spaces and explore green infrastructure development in support of sustainability, including green roofs and rain gardens.
- Measure and highlight the health and economic benefits of sustainability to residents.

Community Setting

Infrastructure Improvements

The assets of a region that support an innovation economy include its human capital, its public and civic institutions, and its physical and virtual infrastructure that allows people to live in the region and businesses to thrive there. The provision of parks can be considered in this vision.

The MAPC *2012 to 2013 Annual Update to its Comprehensive Economic Development Strategy* notes that Boston overall has good infrastructure systems that have contributed to general economic success. The future challenges include the maintenance, modernization and expansion of these systems due to the age of the systems, changing demographics and lack of funding sources. Of particular note are needs related to transit systems, stormwater infrastructure and energy infrastructure. The need to provide equitable distribution of infrastructure investments is critical, because it will determine where growth occurs and who benefits from it.

Development decisions in the future will be determined by the baby boomers and the milennials. These two groups have trended towards a distinct preference for urban environments, with living and working environments that require less automobile dependence with access to a wide array of entertainment and innovation and economic opportunities. From an infrastructure perspective, this creates a need for more urban investments, particularly with regard to transit which enables higher density environments, and stormwater management which serves to mitigate the adverse environmental impacts of development.

Storm water management is also an issue of increased concern because the need to manage flooding and water quality in urban and suburban areas has necessitated the development of practices that create additional costs of municipalities and developers.

The transit systems of Boston require significant investments to support improvements and expansion. Transit in this region must offer higher quality and greater efficiency. It must also be expanded to support greater density and enhance connectivity. Dorchester does not have transit and any development in this area should include transit oriented development and efforts to prevent displacement of existing low-income residents.

Community Setting

Mass Transit

The City of Boston's Fairmount Indigo Planning Initiative notes that the Fairmount Indigo Line passes through the neighborhoods of Downtown Boston, South Boston, Roxbury, Dorchester, Mattapan and Hyde Park. There had been only four stops along the corridor. The line bypasses large sections of lower-income urban neighborhoods that have endured the environmental impact of the train without enjoying the benefit of access to it. The MBTA has constructed four new stations strategically located along the Line at Newmarket/South Bay, Four Corners, Talbot Avenue, Cummins/Blue Hill Avenue *(in design)*.

These new stations will significantly expand transportation options (both rail and bus) for communities living within the Fairmount Indigo Corridor. Approximately 40,000 people live within a one-half mile walk of the existing four stations. An additional 42,000 people live within a one-half mile walk of the four new stations. If all six new stations were to be constructed, an additional 68,000 people would be within a one-half mile walk of a transit stop.

While the addition of the new stations is an important step in improving mobility for local residents, connecting the Fairmount Indigo line with major cross-roads can further enhance its viability. In addition, there remains a need to increase access to jobs and affordable housing, to spur increased capital investment for current and future businesses, and to improve the livability of the neighborhoods as a whole.

MassDOT's Capital Investment Plan for FY2014-FY2018 outlines how the state will spend about $12.4 billion over the next five years as investment in public transit, bike paths, paratransit, roads, bridges, airports and railroads. The plan seeks to fund investments that will enhance mobility, improve safety, stimulate economic growth and protect the environment. The improvements are below:

$75 million in matching funds to the MBTA for the purchase of 392 new buses.

Green Line Cars ($2. 6 million) – supports initial planning and design work to replace the entire existing Green Line fleet, with anticipated delivery of new vehicles beginning in FY2021.

Community Setting

Green Line Extension [GLX] ($1.3 billion) – this will fund procurement of vehicles, construction of stations and improvements to rail and signal systems to enable service to Somerville and Medford by FY2020.

Red and Orange Line Program ($835 million) – this represents initial funding for a $1.3 billion program to replace the Red line vehicles and Orange Line vehicles (120 Orange Line cars and 74 new Red Line cars) as well as improvements to tracks, signals systems and improve capacity and frequency of trains for customers.

The report notes that the Red Line is the transit backbone of the region's innovation economy, connecting Kendall Square to the Massachusetts General Hospital campus and then to the Innovation District via South Station and the Silver Line.

The Orange Line runs through North Station through Roxbury and Jamaica Plain. It serves hundreds of thousands of residents, including many low and moderate income persons. The provision of development along this line will advance a host of smart growth and equity goals.

DMU Service and Silver Line to Chelsea ($ 252 million) – implementation of diesel multiple unit vehicles (independently powered subway vehicles running on commuter rail lines) and expansion of the Silver Line service will provide reliable public transit to underserved communities in the Fairmont Corridor of Boston, Chelsea and the North Shore. The DMU funding will establish the new Indigo Line, using the Fairmont commuter rail corridor, to provide faster, more reliable service to that region of Boston. The Fairmount Indigo Line currently only makes five stops as it travels through Downtown Boston, South Boston, Roxbury, Dorchester, Mattapan, and Hyde Park. MBTA has been working on adding new stations along that route to better serve residents in those neighborhoods.

The Silver Line links the developing South Boston Seaport District with Chinatown, the South End, Lower Roxbury, downtown and Logan Airport. The project also resulted in a new park along Fort Point Channel, and pedestrian and bicycling accommodations in the Washington Street portion of the corridor in the South End. The Silver Line increases access to waterfront open spaces at the

Community Setting

Fort Point Channel and South Boston Seaport districts from inland Boston neighborhoods.

Maximum Build-Out

A maximum buildout analysis starts with the available land in each zoning district and makes projections of additional housing units and commercial/industrial space according to each district's minimum lot size and other regulations. The projections only account for as of right development and do not include development by variance, PDA or other approval that may increase the amount of development. These buildout projections are combined with Census and other data to create a profile of a community at buildout according to its current zoning. The variables that are derived include additional residents, additional school children, additional residential units, additional water demand at buildout, additional solid waste, and additional roadway at buildout (miles). A need for open space could also be derived from this analysis.

In the late 1990s, the MAPC generated maximum build-out scenarios for municipalities within the region. However, given the complexity of Boston's zoning code, only two small areas were attempted for the build out analysis. As a result, it was deemed infeasible to go further with a build out analysis of Boston. It was also understood that most new development in Boston is located in areas where development has already occurred.

A maximum build-out analysis is a display of the results of all allowable development on all developable land. This is a concern to open space planners because potential open spaces that are not protected may be developed. However, even without this analysis, the potential for losses of open space can be seen in the zoning maps mentioned earlier. These maps shows the general zoning districts for open spaces of conservation and recreation interest. Open spaces with the cross-hatching are ones deemed protected; the protection for these lands actually is stronger than the zoning, and supersedes it. Open spaces without the cross-hatching are not considered protected in perpetuity. The zoning of these parcels can be a more critical factor. How these unprotected areas may be protected from development is the subject of much consideration at the Boston Parks and Recreation Department.

Community Setting

Environmental Impacts

Boston does not have a Master Plan to inform a Zoning Map, and no maximum buildout scenario has been completed for the city as a whole. Therefore, development occurs on an ad hoc basis, without consideration for the city as a whole, or relations of neighborhoods to each other. Therefore, development patterns are hard to predict because there are a number of factors, such as market forces, infrastructure availability, changes in zoning, and environmental constraints that determine how land is developed.

A project that does not meet the zoning requirements may seek a variance from the Zoning Board of Appeal. The Parks and Recreation Department tracks these requests for variances through the BOA as neighborhoods with growing densities are seeing an increase in buildings that maximize and exceed the zoning, and seek relief from the minimum onsite open space requirements, thus putting pressure on existing open space.

MAPC provided a *2012 to 2013 Annul Update to its Comprehensive Economic Development Strategy*. This report states a goal to promote economic development policies and practices driven by Smart Growth Principles. It notes that regional development patterns of the past have ceased to be in the long term self-interest of future generations. Smart growth will focus a larger share of regional growth with central cities, urbanized areas, near transportation nodes, and in communities already served by adequate infrastructure. The intent is to encourage density in some places in order to save open land in other places. This is an exceptional goal, however, the impact of this on the provision of parks within Boston, as density increases, needs to be assessed.

MAPC encourages policies to promote the redevelopment of brownfields and regulate the development of greenfields in order to enable compact growth, protect natural landscapes, and focus economic growth.

MAPC has a goal to develop the Region's Green Economy. It supports the development and implementation of local and regional, state and interstate plans that foster development projects, land and water conservation, transportation and housing that have a regional benefit. The MetroFuture plan includes goals to protect natural landscapes and conserve natural resources.

Community Setting

MAPC has projected that there will need to be 435,000 housing units created in the region by 2040 in order to accommodate and encourage growth. This growth will be primarily in multi-family housing, as lifestyles change to accommodate younger workers and aging baby boomers. This added density in units typically without private open space, will need to be served by open space.

Meeting the minimum usable open space per dwelling unit zoning requirement onsite has become a challenge in densely developing neighborhoods like South Boston where developers are maximizing the development on a site and seeking variances by which to do so, including seeking relief from the minimum onsite open space requirements. This puts pressure on existing open space in an already dense neighborhood.

The Article 80 review criteria and requirements do not specifically require that a project consider its impacts to parks, or benefits to parks. There is no standard formula or criteria to determine how a particular development may impact or benefit the existing parks in the neighborhood.

The Parks Department has begun conversations with the BRA to formalize a set of review criteria for the provision of parks, as well as researching other communities around the country that have begun to adopt standard migration of impacts through in lieu of payments or impact fees. It is expected that this Open Space Plan will be used as the basis for future analysis during the Article 80 process.

The BRA may require that a developer provide open space as part of a community contribution negotiation for the project. However, at this time, this contribution of publicly accessible open space is not required to be protected in perpetuity, so the land that is provided to mitigate development is typically not permanent open space.

The BRA may approve a Planned Development Area for a project that codifies the development potential of a particular parcel through an extensive public process, review and negotiation. The end result is that the required provision of open space on a site may be changed during this approval. The Parks Department therefore must participate in the review process proactively to ensure that the project does not trade its open space requirements for other

community benefits, and that the impacts are minimal to the neighborhood's open space infrastructure.

The BRA may also approve Institutional Master Plans that determine how a school or hospital will grow over a decade. There are no requirements for open space in this approval process. The IMP process also requires that residential needs be increasingly met on campus, thereby leading institutions to look to their open spaces as building sites. The desire for new integrated science facilities to train the workers of the future and to attract research funding also become priorities for development, putting further strain on tight urban campuses. Open space may be provided in the IMP, but a later amendment, or a future IMP may utilize that open space. There is no requirement that the open space be protected in perpetuity. The institution may them eliminate the open space that served its users, or look to the City's open spaces to serve its users, adding pressure to public spaces.

There is already a heavy demand put on the open space resources in Boston and the Metropolitan Boston Region. Boston is located in the Metropolitan Boston Region, a highly urbanized and densely populated area. The Metropolitan Boston Region contains approximately 32% of the state population but only 4.8% of the land area. The per capita acreage available for open space and recreation is only .03 acres per person. Land available for open space and recreation is more limited than in other parts of Massachusetts. However, the percentage of total land area dedicated to recreation and open space in this region is 26 percent. This ranks third among the seven SCORP regions in total land area percentage dedicated to recreation and open space.

The most popular activities (listed sequentially from highest to lowest) in this region's open space areas include: walking, sightseeing, swimming, golfing, picnicking, playground activity, sunbathing, fishing, biking, tot lot activity, basketball, and baseball. The 2006 SCORP notes that the more heavily used resources in the region are golf courses, neighborhood parks, playgrounds and tot lots, lakes and ponds, and historic and cultural sites. Overall the satisfaction levels of the Metropolitan Boston Region are much lower than other SCORP regions. High levels of dissatisfaction were associated with rivers or streams, bikeways and golf courses, neighborhood parks, playgrounds and tot lots. These resources

seem to be suffering due the overall population density of the region.

The BRA will negotiate for provision of open space as a community benefit on some projects being reviewed through the Article 80 process. However, the mechanisms to determine how the impacts are determined, how the contribution is formulated and how park property is protected in perpetuity are not clearly understood at the current time.

The BRA requires that Institutional Master Plans meet a goal to house more students on campus. This has recently necessitated instances where universities have built on open space and athletic fields within the campus boundaries, and then looked to the City's parks to meet the recreational needs of the students. Also, there is no requirement for the provision of open space in an IMP, and no assurance that open space that is shown in an IMP will be protected in perpetuity.

The BRAs Article 80 Review provides an opportunity for the Parks and Recreation Department to more proactively engage in the project review and impact mitigation. Efforts are currently underway by the Parks Department and the BRA to create a more robust process for evaluating impacts to parks, and a more transparent and standardized manner to mitigate those impacts.

The Parks Department will engage proactively at the beginning of the Article 80 Project Review process, ideally at the Scoping Session in order to build a communication with the applicant about the project, issues related to open space, and potential mitigation.
The Parks Department/ Commission will create guidelines for design review that coincide with the Article 80 process.

Impact assessment – The Parks Department will prepare a standardized Impact Assessment Method to be used within the Department's review of projects through Article 80.

The Parks Commission will requests copies of any Development Agreement involving contributions to Parks, and facilitate and monitor these contributions.

Community Setting

Sources:

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